THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIII. No. 1874.] LONDON, APRIL 11, 1899. [51ST YEAR. PRICE 6d.

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FOR
GAS PURIFICATION,
For use in the
RECOVERY OF SULPHUR,
ALSO
Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

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Rich in Illuminating Power and Yield of Gas.
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13, CROSS STREET,
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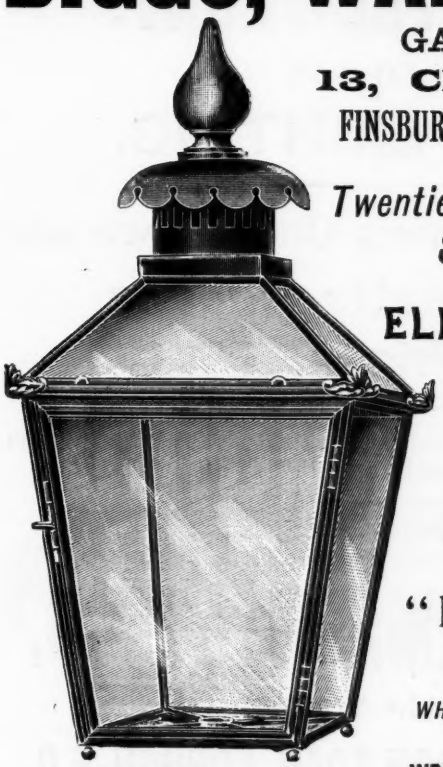
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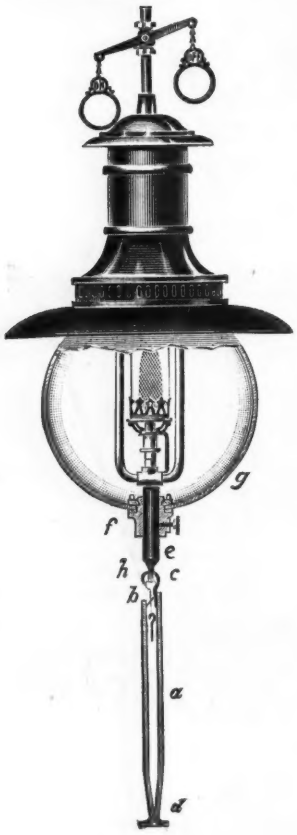

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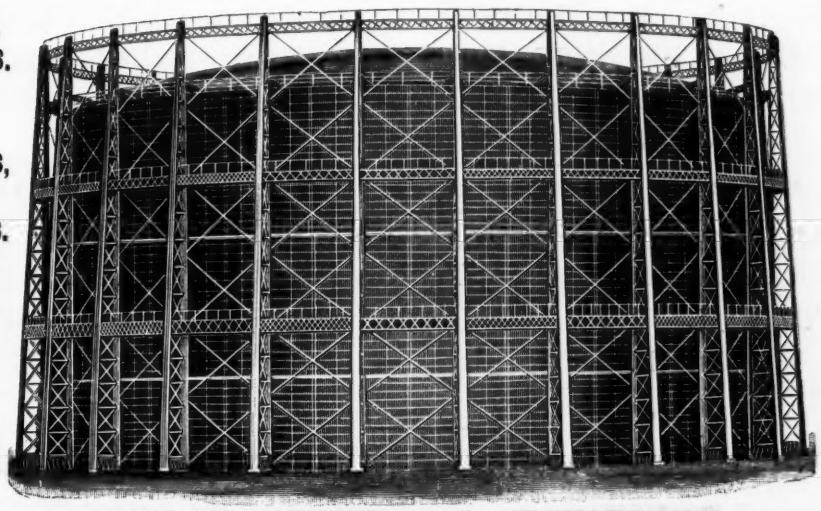

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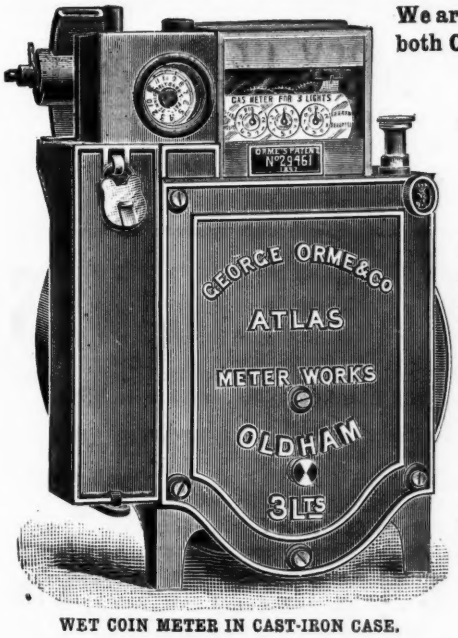

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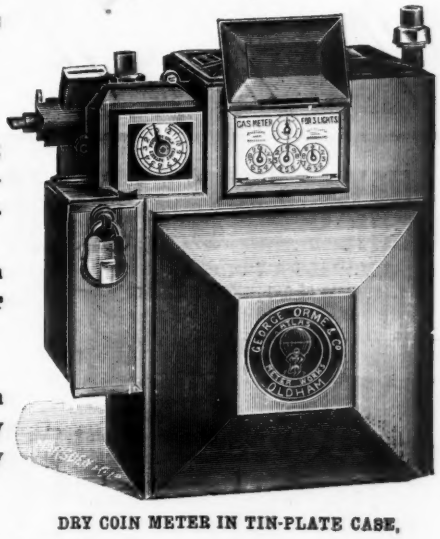

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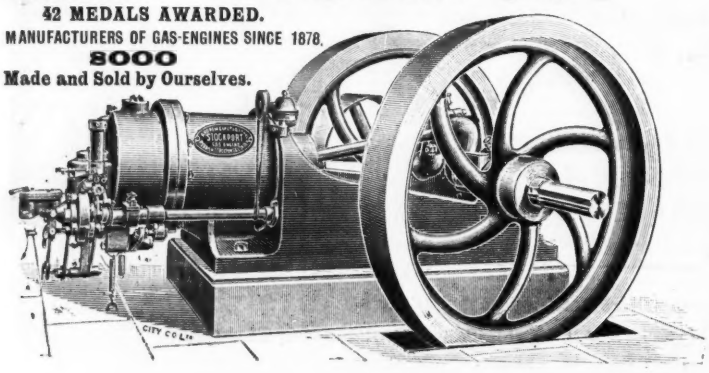

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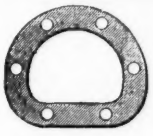

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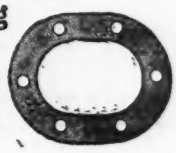

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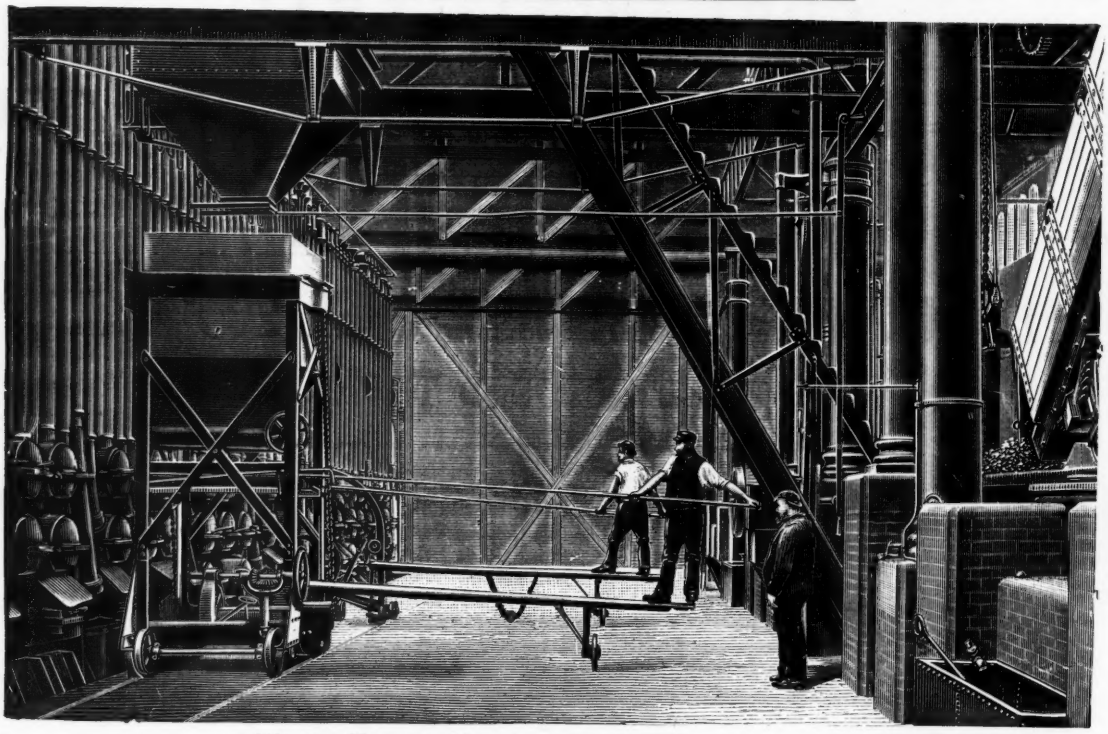

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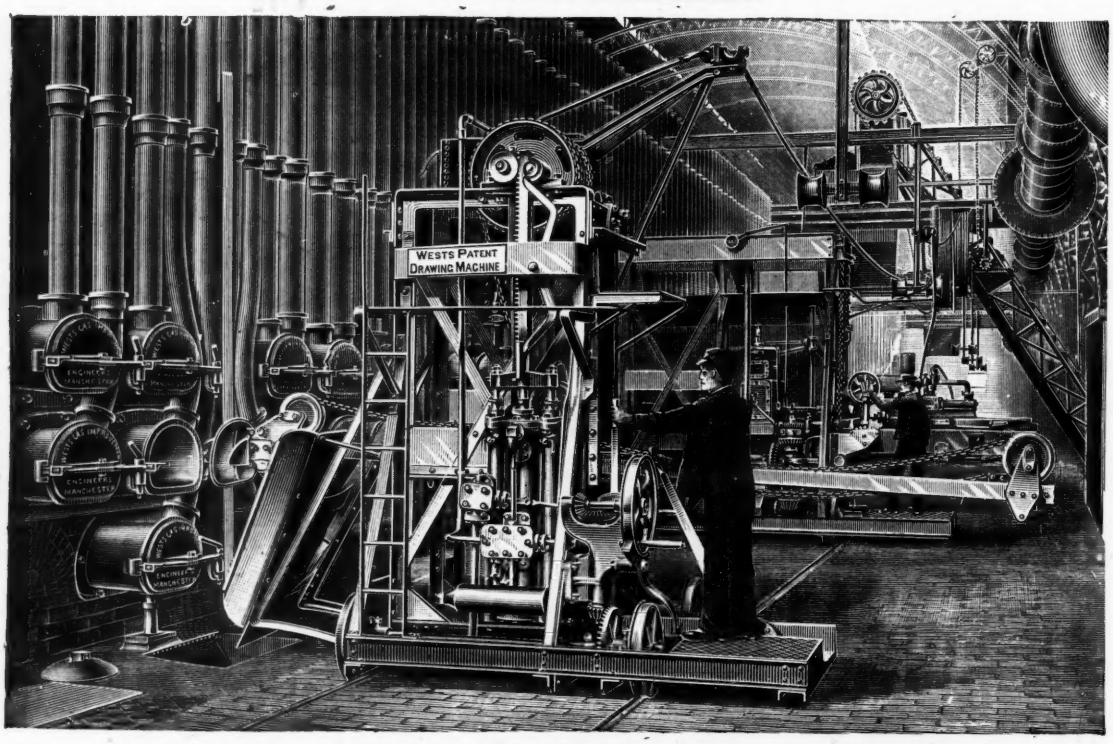

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Analysis made by
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Illuminating Power . . .	16 9 Candles.
Coke (of good quality) . .	67·5 per Cent.
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Ash	2·73 ,,

For Price, &c., apply to the
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GAS COALS.
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Illuminating Power	$16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality)	$13\frac{3}{4}$ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
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Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

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Has now gained a complete and final Victory over its last and greatest Enemy
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Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

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Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

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Illuminating Power	16·3 candles.
Coke	73·1 per cent.

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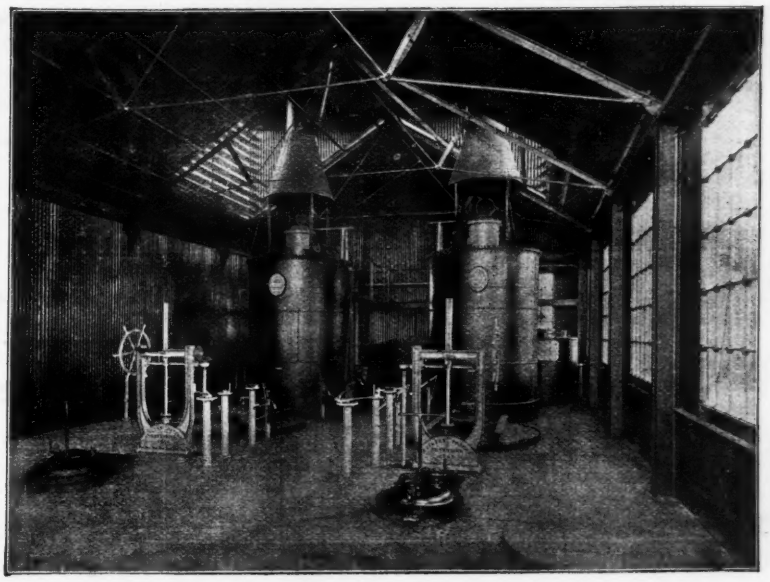
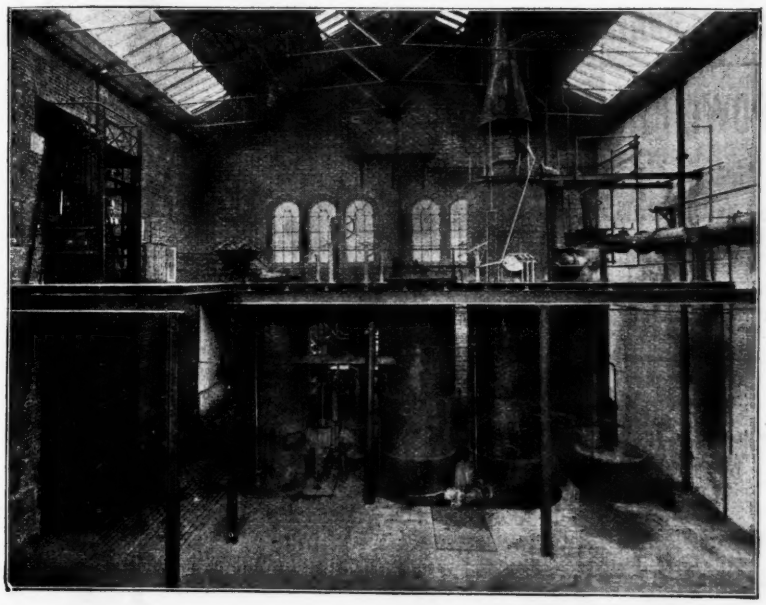


Water-Gas Plant at Southall.



Water-Gas Plant at Folkestone

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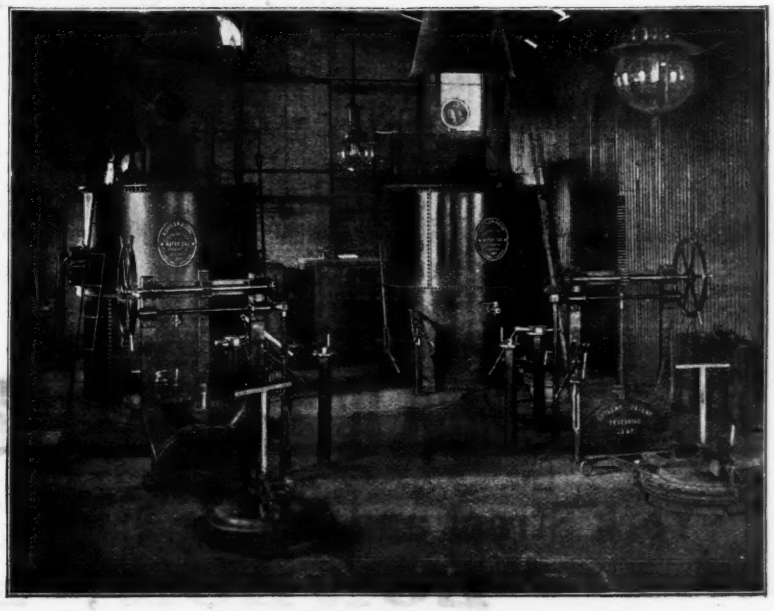

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NEW WELSBACH BURNERS.

25 Candles per Cubic Foot of Gas.

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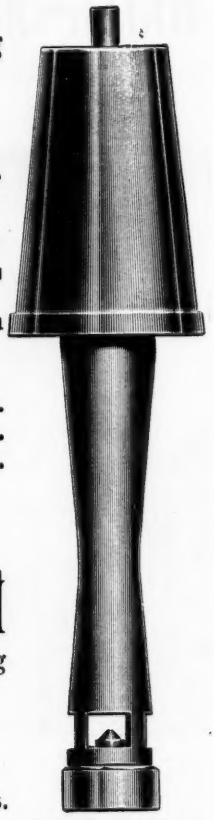
The New Welsbach Burner is supplied in SIX Sizes, consuming from ¾ to 7 Cubic Feet of Gas per Hour.



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100 CANDLE POWER WITH 4 CUBIC FEET OF GAS.

To obtain a light of 100 Candles for 4000 hours with Gas at 2s. 3d. per 1000 Cubic Feet would cost—

With an Ordinary Gas-Burner	£18 0s.
With a new Welsbach Burner	£1 16s.
With an Incandescent Electric Lamp, at 5d. per unit	£30 0s.

THE

New Welsbach Anti-Vibration Attachment

Enables the New Welsbach Burner to be used for Street Lighting or otherwise, notwithstanding the severest vibration.

Made of Metal throughout.

Simple, Durable, Inexpensive.

Does not obstruct the Light.

HYDRO-PRESS GAS-LIGHT APPARATUS.

THE NEW METHOD OF PRODUCING A HIGH CANDLE-POWER LIGHT.

Especially recommended for use in Workshops, Railway Yards, and Open Spaces, where a high-power light from one centre is desired.

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GAS ENGINEERS, **BIRMINGHAM.**

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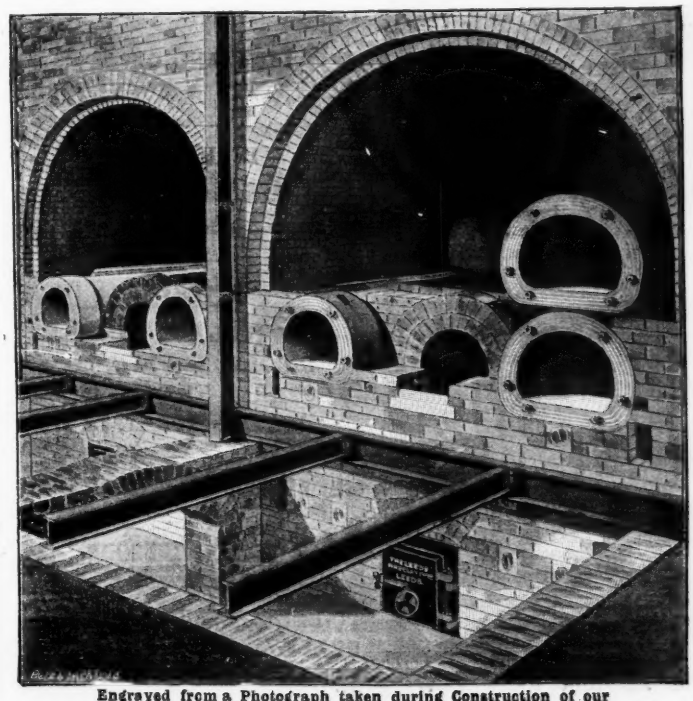

Engraved from a Photograph taken during Construction of our Shallow Regenerator Settings.

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OF EVERY DESCRIPTION

INCLINED, HORIZONTAL,

REGENERATOR, GENERATOR,

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SHALLOW REGENERATORS A SPECIALITY

MANY INSTALLATIONS.

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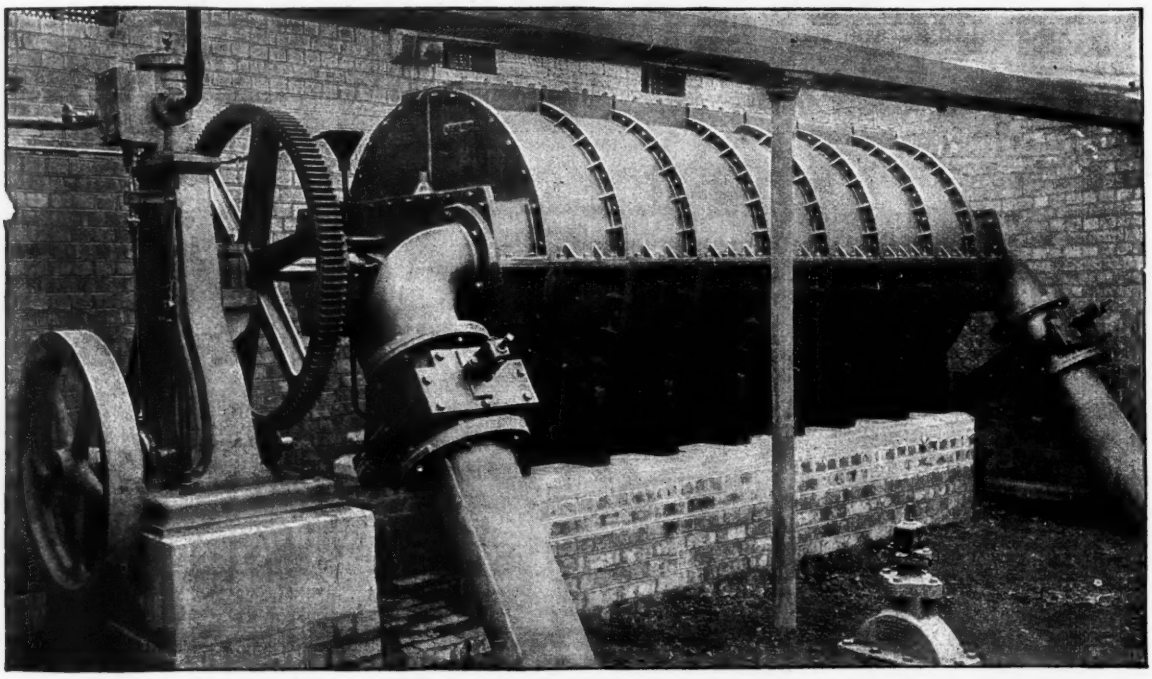

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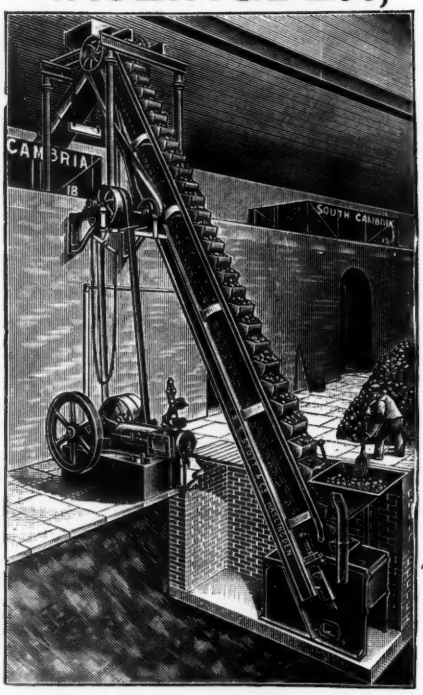

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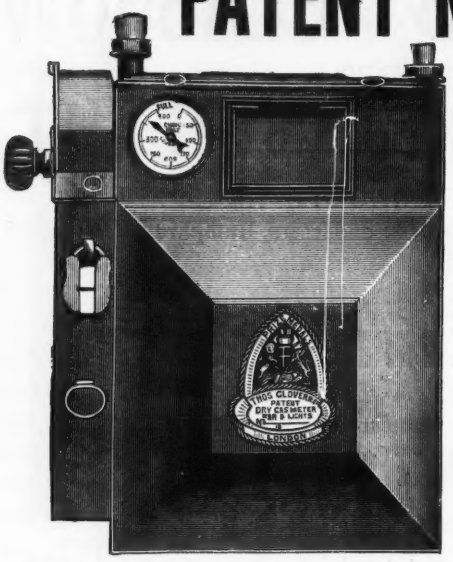

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EDITORIAL NOTES.

Mr. Brackenbury on the Metric System.

WE are obliged to Mr. C. E. Brackenbury for his interesting letter on the Metric System. It is very easy to get up a nice little controversy on this subject at any time; because the question of the comparative utility of the metric and the old English systems of weights and measures is one that never gets sensibly nearer to a definite answer. In passing, we observe that Mr. Brackenbury finds our last editorial reference to the matter deplorably frivolous, and also instinct with "extreme conservatism and infallibility." He compares this article disadvantageously with a more dignified one which appeared on July 9, 1895. Well, our only excuse for having dropped into a less solemn style of treating this great subject must be that on this occasion we were following Sir Frederick Bramwell; while in 1895 we had to follow Sir Henry Roscoe. That is all the difference. With reference to the alleged divergencies between our expressions of opinion in 1895 and 1899, we have again read the former article, and cannot discover in it any greater contradiction of the later remarks than arises from the obvious fact that it was inspired by the report of the Parliamentary (that is, Sir Henry Roscoe's) Committee, and took some of the views therein stated. Even so, however, our article specified as many obstacles to the adoption in England of the metric system as the advantages we referred to "*pace* the Committee." True, we admitted that gas engineers would not object *on principle* to deal in cubic metres of gas in place of thousands of cubic feet; but we at once mentioned a practical difficulty, and confessed inability to see how this could be overcome. The difficulty is that, if gas were sold here by the cubic metre, the smallest coin of the realm, the farthing, would be too great to use in alterations of price up or down—¼d. per cubic metre being equivalent to 7d. per 1000 cubic feet. Mr. Brackenbury does not meet this objection, nor make any attempt to show how, by the metric system, a reduction of price of 1d. or 2d. per 1000 cubic feet could be brought to the cognizance of the purchasers. Our remark about the "principle" being unobjectionable merely meant that there is nothing in it to affect the gas industry in itself, as, of course, Continental experience demonstrates. The question is what is likely to be most convenient for England and English trade, in gas and other commodities.

Mr. Brackenbury surely does himself an injustice when he declares himself unable to understand Sir F. Bramwell's point that it is not possible to do mental arithmetic in decimals. He gives a case of simple multiplication; but what Sir F. Bramwell (and we) had in mind was fractions. He declares that "the Continental shopkeepers do not find "it any more difficult to carry on their over-the-counter "calculations than their British brethren, struggling with "their shillings, pence, and farthings." In the first place, the question is not of the currency, but of weights and measures. The partisans of the metric system have abandoned the correlative idea of altering the British pound sterling or its subdivisions; so that those of our correspondent's remarks relating to "mental shop calculations" in money are simply beside the mark. Moreover, it is a little exaggeration to speak of the British shopkeeper or his assistants as "struggling" with their sums. Such a criticism smells of the study rather than of the mart. Why, even though the drapers and "fancy dealers" needlessly complicate their little bills by the wilful introduction of the "frolicksome farthing," did anybody ever see them boggle over the total? But as to the mental calculations of the Continental retailer and his customers, is it not the notorious fact that both parties habitually split the units into aliquot parts, just as we do? In France, people buy meat, bread, and groceries by the *livre* (or pound), which they know is half a kilo. Do they ever ask for 500 grammes of anything? But the metric system knows nothing of "halves" or of "quarters." Both in France and Italy the local names for fluid measures remain in force. When Mr. Brackenbury was in Italy, how many times did he pay *cinque centesimi* for a small article, without its being called a *soldo?* Just so, the French peasant thinks in *sous*, as he always did and always will.

We have somewhere pointed out that where European nations used the *sou* as a currency unit for small commerce, the adjustment to the decimal system of coinage was comparatively easy. Practically, as already remarked, the old

name is usually retained. Again, where provincial systems were too diverse to afford the data for a national—to say nothing of a universal—system of weights and measures, the imposition by Government of the metric system was justified. It will not do, however, for Mr. Brackenbury to repeat the hackneyed complaints of the complications of the English trade units, which are the stock-in-trade of the Decimal Association, as though they effectually settled the question of expediency. We have all heard the worst there is to be said about the various "stones," "fodders," and so forth. Those who would abolish them out of kindly consideration for the overwrought brains of their users should first inquire why they are continued in use. It cannot be for old associations' sake, or out of "pure cussedness," that the butchers of Smithfield perform their lightning calculations in the dead-meat stone of 8 lbs. What would happen if Government were to attempt to force the metric system upon these men; and yet, how else can they be converted? A correspondent of "The Times" puts the truth in a nutshell by stating that no nation ever adopted the metric system by the common consent of the people. It has been forced upon many nations by their Governments; and those who prefer it are at liberty to use it in England and America. Only, they do not care for it—excepting the chemists. Engineers and others who have learnt the convenience of ciphering in decimals instead of in vulgar fractions, are not necessarily friendly to the idea of changing all our English units for the metric ones. Mr. Brackenbury is a little at sea in ascribing the loss of British trade to American competitors as connected with our adherence to the old English system of weights and measures. Englishmen and Americans are agreed upon this point; and Russia bears them in countenance. We cannot accept our correspondent's airy dismissal of the impracticability of reconciling the metric system and screw-threads as an immaterial objection, but are quite willing to confess that we were not aware of the existence of the trouble so long ago as July, 1895, or it would assuredly have been mentioned at the time.

Now, in "The Times" of the 1st inst., Mr. F. Howard Collins recounts another practical failure of the decimal system, in the manufacture of optical lenses. The great Jena firm who are the largest makers of microscope lenses, found the system so cumbrous that they have fallen back upon a hybrid plan of making our inch the unit, and saying that it shall be equal to 24 millimetres; which is wrong. In this way they are able to give all their objectives whole numbers. Of course, the fault may lie in the requirements of the trade. It would doubtless be better if these necessities squared perfectly with the French theorists' metric system; but when the discrepancy exists, which is to give way, the manufacture or the system of measurement? The traditional French logician, when reminded that the facts did not agree with his conclusions, remarked: "So "much the worse for the facts!" This appears to be exactly the position of the modern partisans of the metric system. It is legal; it can be used by anybody who likes it. The chemists do like it; and they use it. English, American, and Russian commerce and industry do not take to it; and until our people alter their minds on the subject, it is useless to expect the adoption of the system. Mr. Brackenbury admits that 113 millions of people are using our cumbrous old weights and measures; and these are usually self-willed, hard-headed people, who in most affairs are supposed to know what they want, and to have a powerful knack of getting it.

Government and the Flash-Point of Petroleum Oil.

THE intimation to which we lent currency a fortnight ago—that in the forthcoming Government Petroleum Bill there will be three classifications of the commodity, instead of but two as now, may either be a definite piece of information, or it may be put forward as a "feeler." The latter proceeding would not be very dignified; but it is not altogether unprecedented in similar circumstances. The suggestion is that the distinguishing line between mineral spirit and oil shall remain the flash-point of 73°, as at present; but that some restrictions similar to those now applying to the spirit shall be put upon the handling and storing of oil flashing at 85° and under. Above this, the trade would be left free and open, as it is now for oil of 73° flash-point. Until it is known what is to be the treatment of the middle-grade oil—that is, the bulk of the American kerosenes imported into, and burnt as lamp oil in, this country—it is impossible to say whether or not the regulations will be detrimental to trade. If, as is probably meant, some harmless restriction is intended on the occasionally reckless retail oil-shop keeper, then nobody interested in the maintenance of a cheap oil supply need object. But the sound of the suggestion has been taken by the high-flash newspapers, and with justice, as a warning that the Government do not mean to be bullied or cajoled into doing anything to raise the price of all oil so as to please the Scotch and Russian trade interests. Consequently, they are furious. What they want is to completely shut out the free-burning American kerosene from the British market; and nothing short of this Protective measure will satisfy them. They will persist in holding up the flash-point as something which has to do with the applicability of petroleum to burning in common lamps; whereas, of course, it is only a means of classifying the commodity for the purpose of carriage, handling, and storing. What the "Daily Chronicle," for example, seems to argue for—that is, so far as we are able to understand it—is an Act of Parliament forbidding the burning of petroleum which flashes at less than 100°. Well, so be it. A deputation of those costermongers to whose wishes the London County Council has shown such deference on other occasions would soon persuade this authority that it would not be expedient to interfere with the use of the democratic naphtha "flare." Our very perfervid daily contemporary further observes that "once it is admitted that there is a "danger in oil, there is no alternative but to raise it to a "point which will secure safety." What point is this?

Mr. Ure has been in Mid-Lothian again, addressing his disinterested constituents on the vexed question. He began by declaring that the subject had not assumed a party tinge. It is the merest coincidence that the raising of the flash-point would benefit the Scotch oil trade, and lay the American product under an embargo. But Mr. Ure is not to be deterred from taking part in the agitation for the rise by this consideration! There was neither trade nor political interest in the question for him; but, all the same, he thought it might be made available for "over-"throwing a faltering, an incompetent, or a wrong-headed "Ministry." There is no party feeling here. Mr. William Thomson, of Manchester, has also been stirring up the question before the Manchester Section of the Society of Chemical Industry. This is the expert who had to admit before the Parliamentary Committee that he had tried his best, but without success, to make a petroleum lamp "explode." In the newspapers, all lamp accidents are explosions; and Mr. Thomson entertained the Manchester chemists with a paper on the lamps which, as he asserted, had "exploded" in Manchester and Salford "during the last few years." The matter seems to have lacked freshness. The abstract report of the proceedings given in the "Manchester Guardian" does not afford the smallest indication that Mr. Thomson has yet managed to bring off that sample explosion, or that one of his examples belonged to this category. On the contrary, thirty-two of his forty cases were lamps of the same sort; "this par-"ticular pattern being exceptionally dangerous. In every "case the reservoirs of the lamps which exploded were of "glass." But why should a glass reservoir "explode" more readily than a metal one? One can understand that it would smash more easily; but this is not exploding. As it stands in the report, Mr. Thomson's testimony goes more against the lamps than the oil. There was never a controversy in which facts were more garbled, misrepresented, and deliberately ignored when they did not support the argument, than in this high-flash agitation.

The Strike in the Building Trade.

IT is some time since we mentioned the strike in the building trade, for the simple reason that there has been nothing to say about it. Last week, however (just a month after the commencement of the lock-out), a conference of the associated masters and representatives of the men was held in London. The employers have all along been willing to assist at a conference, provided the men could be got to agree upon the specific points to be discussed; but this, for some reason or other, they persistently declined to do. At last, upon the receipt of a moderately conciliatory letter from the Union officials, the employers' Committee managed to arrange for a meeting. It was stipulated by the masters, however, that the delegates to the meeting should be fully authorized to settle the questions at issue; and it

was also stated that the employers would submit a definite form of guarantee to secure that both sides should abide by any agreement that might be arrived at. The men accepted the conditions; and accordingly the parties met. Unfortunately, but not unexpectedly, the meeting broke up without settling anything. The masters put to the delegates of the men four written questions to which they demanded categorical replies. To the question whether the Union was prepared to enter into a monetary guarantee for the faithful observance of any agreement arrived at, the answer was a negative. Asked whether the Union men would consent to limit their efforts to induce others to join the Society to "persuasion," the delegates would not answer in the affirmative. Consequently, feeling that it would be useless to prolong the negotiations, the employers withdrew. Thus the conference ended. It was evidently premature. The men are not yet tired of playing to the piping of their Union Executive; but when the heavy levies on the members at work, which almost reduce them to the financial condition of those on strike, begin to grow irksome, a change will come over their views.

The Affairs of the Commercial Gas Company.

THE ordinary general meeting of the Commercial Gas Company was held on Thursday last, under the presidency of Mr. J. Blacket Gill, Chairman of the Company. Owing to the fact of the issue of the Directors' report and the statement of accounts of the working of the undertaking for the past half year coming at a holiday season, we were unable to notice the principal figures in this column last week, according to custom. Not that there is anything specially noticeable in the official publication, even after the Chairman has had his say upon this text. Mr. Gill admitted that the Board are occasionally twitted with the meagreness of their reports. But he went on to remark that the dividend announcement is the main thing, after all; and that, so long as this is satisfactory, the proprietors need not trouble about the paucity of other information about the Company's doings. We believe that this is a mistaken view of the duty of the directorate of a Gas Company. Of course, if the proprietors are to have their dividends flung to them, and are not to be encouraged to interest themselves in the smallest degree as to how the money is earned, Directors' reports and general meetings might be dispensed with. Mr. Gill is an amiable and an upright gentleman; and it is not to be believed for a moment that he wishes to encourage the enemies of private enterprises like the Commercial Gas Company in the delusion that these are automatic dividend-earning machines, pure and simple. Yet he must see, on reflection, that the language in which he indulged on Thursday is open to this interpretation. It is not wise to magnify the dividend to the exclusion of every other consideration. To do so is to put a weapon into the hands of Municipalists which will not grow rusty for sheer lack of use. The Commercial undertaking has prospered well during the last half year; and the administration will not have any reason to be ashamed when they meet the Parliamentary Committee in a few weeks. Mr. H. E. Jones, the Company's experienced Engineer and General Manager, was too wary to say anything in advance about this ordeal; but he may have a tale to tell at the next meeting. Strange to say, the Chairman took the opportunity offered by the contemplation of a rising coal market to drop a sympathetic tear over the vanished London coal dues. He seems to cherish the oft-exploded Protectionist illusion that an indirect tax is not felt by the consumers of the dutiable article; and for this he was pulled up rather sharply by Mr. George Livesey, who always regarded the duty on coal as a tax on gas, and worked strenuously for its removal. Mr. Gill would be well advised to let the coal dues lie in their grave. Whatever happens, London coal is never likely to be taxed again; and London gas will only be made subject to a duty if the gas undertakings should ever be municipalized.

The Informal Meeting of Scotch Gas Managers.

THE Informal Meeting of Scotch Gas Managers, which was held in Glasgow last Wednesday, has laid the foundation for what may be made a most successful year in the matter of professional gatherings in Scotland. An informal meeting is a more risky concern to run than is the stated meeting of an organized body. There is so much that is "pot luck" about it, that various causes may lead to the making or marring of it. None of these made their appearance at last Wednesday's meeting; and the stream of discussion flowed smoothly and uninterruptedly from start to finish. Much of the success of the meeting is due to the style of address with which Mr. W. Ewing, of Hamilton, opened the proceedings. Mr. Ewing does not deal in theories, as his paper read at the North British meeting last July, as well as this address, showed. Facts and experiences, told with perfect frankness, are what he sets forth—matters which come home to everyone. The effect is found in the readiness with which the hearers joined in the succeeding discussion. The old adage about the proportionate value of theory and practice is here exemplified. Readers of future papers, if they wish to lead off a spirited discussion, should note this. The number of gas managers who took part in the proceedings was much greater than usual, which was largely owing to the tact with which the meeting was handled by the Chairman and Mr. A. Yuill, of Alloa, the Convener. But, giving these gentlemen all due honour, it was probably as much owing to the fact that gas managers had come up, after their winter's work, in good heart, and spoke from the fulness of it. Prosperity, it may be gathered, is still stamped on the important industry of making and selling gas.

Sir Henry Fowler on Taxation.

SIR HENRY FOWLER, addressing his constituents at Willenhall last Thursday, made a speech which is quite refreshing in these days, when Party leaders seem to limit themselves to echoing the small clamouring of the newspapers, and to be afraid to show they know a little more of the science of statesmanship than "the man in the street." The subject of his address was the sources and objects of Imperial taxation; and it was a masterly effort. Taxation, as the speaker observed, is something that concerns everybody. There are no more familiar words in the language than "rates and taxes." Sir H. Fowler left the subject of rates alone, and talked only of taxes. It was enough for one speech. With the national expenditure growing on all sides, it is a consideration for all responsible citizens how the funds are to be provided. Whatever may have been Sir H. Fowler's purpose, as a politician, he showed to demonstration that the taxation of the United Kingdom comes from very few—perhaps dangerously few—sources. An intelligent foreigner, when reading this statement, must marvel at the little the British exciseman has to do. But there is the income-tax! That is a huge impost, bringing in, during these peaceful times, 17¼ millions sterling a year. The death duties return 15¼ millions; and stamps bring in 7¾ millions. If it were not for the steady drinking habits of the people, and their practice of using tobacco, which help the Exchequer to the tune of nearly 50 millions every year, the payers of direct taxes would fare far worse than they do. A study of Sir H. Fowler's speech is a very good preparation for the Budget speech that we all look forward to with such mingled feelings. That the income-tax will be reduced seems out of the question. Further indirect taxation is not to be dreamt of. Yet the Chancellor of the Exchequer wants more money; and it would not be surprising if he were to look for some in a raised stamp duty on those stock and share dealings which every year swell to greater volume.

Coal in Kent.—Another seam of coal has been struck at the Kent Exploration Company's boring at Ropersole, between Dover and Canterbury; making two seams discovered within a week. It is thin, like the other; but they both correspond very closely with the first seams struck in the Dover boring, about nine miles away.

The Strache Water-Gas System.—An account has already appeared in the "JOURNAL" of the installation of water gas, under Dr. Strache's system, at the Vienna General Hospital. The correspondent of the "Financial News" in that city speaks favourably of the results, and says it is believed the new light will effectively compete with both coal gas and electricity.

Waverley Association of Gas Managers.—The half-yearly meeting of this Association will be held next Thursday, in the Central Hotel, Edinburgh. We learn from the circular issued by the Hon. Secretary (Mr. W. B. M'Lusky, of Selkirk) that after the delivery of the Inaugural Address by the President, Mr. John M'Laren, of Duns, there will be a general discussion on subjects affecting the gas industry, including the proposal of the Council of The Gas Institute in regard to the standardizing of meter-unions. The members will dine together at noon, and then drive to the New Grange Meter-Works of Messrs. Alder and Mackay, after inspecting which they will go on to Roslin, where tea will be served in the Royal Hotel.

WATER AND SANITARY AFFAIRS.

In alluding a short time back to the "alarming report," as it has been termed, laid before the London County Council by the Public Health and Water Committees of that body, on the subject of the water supply, we signified that we should probably deal with the document more fully at a later period. We recognize in the report a studied attempt to damage the reputation of the water supply provided by the London Companies, making it in some way run parallel with the supply which proved so disastrous at Maidstone. After pondering the subject for the best part of a year and a half, the Joint Committee to whom the task was confided managed to draw up their indictment just a day or two before the Water Bills of the Companies and the Welsh Water Bill of the Council came on for their second reading in the House of Commons. But the manifesto from Spring Gardens failed to prevent the passing of the Companies' Bills, and it also failed to protect the Welsh scheme from rejection. What effect the Council's report may have on the future progress of the question may be measured by what has already happened; and yet it is only too likely that a certain influence will be exercised, both in and out of Parliament, by the allegations put forth. The report contains a citation of notable authorities, among whom Sir Alexander Binnie appears, together with Sir George Buchanan and the Council's Chemist, Dr. Frank Clowes. The last-named authority is made responsible for a statement very startling in itself, and exceedingly likely to receive an exaggerated interpretation. In short, without intending it, Dr. Clowes may mislead the uninitiated. He puts the case by saying that while there are grounds for believing that "the comparative immunity from "typhoid fever" enjoyed by the consumers of London water "depends largely" upon the effective working of the Companies' filters, it is to be understood that a breakdown in the filtering arrangements might possibly, at any time, provoke a serious epidemic. Of course, it is easy to argue that if something exceedingly unlikely were to come to pass, some extraordinary results would follow. We may allow Dr. Clowes to speculate on such a contingency; but he goes on to say that, though the ordinary process of filtration "may remove 90 per cent. of the bacteria which "are in the river water, it is reasonable to suppose that the "remaining 10 per cent. of the bacteria may occasionally "number in their midst the bacillus of typhoid fever."

Dr. Clowes here seems to say something which he really does not, or ought not, to say. Many people, influenced by his words, might infer that the purifying process performed by the Water Companies really leaves 10 per cent. of the bacteria in the water. What we should understand Dr. Clowes to mean is that filtration alone only removes 90 per cent. of the bacteria. Sir E. Frankland has explained that it is both of interest and importance, in regard to the construction of filters, to separate the improvement produced by final sand filtration from that brought about by storage or preliminary filtration. Accordingly, he has given tables comparing the bacterial quality of the waters supplied to the filters with that of the effluents from them, and has stated the percentage of microbes still present in the effluents. But even when we take the figures thus supplied, we require some further explanation in order to get at "the remaining 10 per cent." mentioned by Dr. Clowes. As stated, the reduction effected by actual filtration leaves a certain percentage of organisms still in the effluent from the filters. In 1896, these remaining organisms were 6 per cent. in the case of the Chelsea Company; that is to say, 94 per cent. were removed. The Grand Junction effluent showed 8·9 per cent. of the organisms still left in, or 91·1 per cent. removed. In 1897, the remaining organisms in the Grand Junction effluent were 7 per cent. of the quantity that entered the filters. These are the three least satisfactory results in the two years. If we take the other results, we find the remaining proportion ranging from 1·2 per cent. up to 3·4 per cent. as the maximum. Hence we fail to find the 10 per cent. spoken of. Dr. Clowes may have some other way of calculating; but here we give Sir E. Frankland's figures. Sir Edward points out that a comparison between the raw river waters and the filter effluents passes by the question of storage, which varies as between the different Companies. The results usually given are those which arise from the combined operations of storage and filtration; and it is the effect of the complete process in which the consumer is really concerned.

Sir A. Binnie has made a report to the Joint Committee in which he says that at the time of Lord Balfour's Commission it was assumed that the filter-beds were a mode of getting rid of all impurity in water. "Since "then," he says, "we have exact evidence that this is not "the case." It would seem that the term "filtration" has been used a little too freely. It is generally employed to cover the whole process of purification, thereby including the effect of storage. Sir A. Binnie says in his report: "In the years 1896 and 1897, Sir E. Frankland made 199 "examinations of filtered water for the purpose of ascer- "taining the number of bacteria, and found that they "varied from 16,000 per cubic centimetre down to "nothing." This 16,000 enumeration appears to refer to one filter out of eight in the works of the Southwark and Vauxhall Company, in the month of December, 1896, and perhaps only on one day. But Sir A. Binnie further says that, taking the whole of the 199 examinations, the average result was 232 bacteria per cubic centimetre. There seems to be some want of precision here in the terms employed. On looking through the reports of Sir E. Frankland for 1896 and 1897, we find that in the former year the average percentage of microbes removed, comparing the raw river water with that which came from the filters, was above 99 in the case of all the Companies except the Southwark and Vauxhall, whose average was 97·77, but whose maximum was 100 per cent.—a result which also occurred with the New River Company. In the case of the Chelsea, the West Middlesex, the Grand Junction, the Lambeth, and the East London, the maximum with each Company exceeded 99; the Grand Junction coming as near to absolute removal as 99·98 per cent. In the year 1897, we find the lowest average of removal to be 97·72, in the case of the Southwark and Vauxhall Company. The average of the Grand Junction was 98·46, of the Chelsea 98·96; the remaining four being above 99. The maximum percentage of microbes removed was 100 in the case of the New River Company; something close to the same absolute result being accomplished by the Chelsea and East London Companies. It is said that figures can be made to prove anything; but certainly these seem plain enough, whatever may be the method by which Sir A. Binnie has worked out his results. If we take the actual number of microbes left, as indicated by the proportion removed, we do not find such figures as Sir A. Binnie gives. The report on which the County Council places reliance may be an "alarming" one; but it seems to depend on some system of calculation of which the precise nature is hard to discover. We may even indulge in a doubt whether Dr. Clowes really intended to limit his remarks to filtration pure and simple.

Gas-Stoves in Bedrooms.—Answering a question put on the above subject by an architect, the Editor of "The Hospital" says that gas-stoves are neither "dangerous nor undesirable" when the stove is properly constructed, properly lighted, and has a good up-draught at all times. Much, however, he points out, hinges on the term "properly constructed," which, of course, includes "properly placed." He goes on to show that the products of combustion with gas and coal are practically the same, with the exception of the soot and tarry compounds which are produced by the latter fuel; and if the provision made for their removal is the same, the result is the same. Unfortunately, the gas is expensive; and the chief—perhaps the only—way in which its use can be made economical is by so arranging the stove that a far smaller proportion of the heat shall go up the chimney than is the case with coal. This is the real cause of much of the evil which undoubtedly does often attend the use of the gas-fires. "When the maker of a gas-stove for the sake of economy lessens the proportion of the heat and also the amount of air which goes up the chimney, although he makes a very good stove, he diminishes the ventilation of the room. It must be remembered that the virtues of the open fire, and the very things for which it is loved, depend upon its being 'wasteful,' as the saying is, and that if we want those same virtues in a gas-fire it also must be constructed on the same 'wasteful' plan—must be put under the chimney, and have a free access of air; and gas being more expensive than coal, the loss will be all the greater. The advantages of gas-fires, however, are so great, that in many cases we may willingly put up with a certain amount of waste of gas for their sake. Moreover, it must be said that much depends upon the chimney. With a chimney that always draws of itself, a much more economical gas-stove may be employed than would be safe with a fickle chimney which requires to be kept warm to make it act."

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 931.)

On the reopening of the Stock Exchange on Tuesday after the Easter holiday, business was quiet enough. This was only to be expected. But what was not expected, and what occasioned considerable chagrin, was that, as the week advanced, things got no brighter. Everybody had been comforting himself and everybody else with the assurance that a gay time was coming; and it did not come. The public seemed to be holding aloof for some reason or another; and the position was very disappointing. Prices all round shrank—nothing serious, but they were decidedly lower; and how long it may be before they rebound is quite a matter of uncertainty. A good deal may hinge on the line which the Money Market may take. It was very stiff last week, and does not seem inclined to bend just yet. Business in the Gas Market was very quiet, and was almost absolutely devoid of interest. Movements in value, too, were of the very smallest proportions; but it is satisfactory to note that they were all in the upward direction. Small business was done in Gaslight issues. The ordinary stock changed hands at good, steady figures; so that on Thursday the buying price was advanced a point. The secured issues were steady and unchanged. Hardly any transactions occurred in South Metropolitans; and there was nothing to indicate any impending movement. Commercials were quite unnoticed. The Suburban and Provincial undertakings were altogether dormant—only two or three bargains being marked all through the list, and quotations being left quite unvaried. Among the Continental Companies, Union was perhaps the most inclined to anything like activity; and both issues changed hands at good firm prices. Imperial was very little touched, and made no sign. Among the rest, further progress was made by Buenos Ayres, and San Paulo had a rise; while both issues of Melbourne bonds were fractionally better on *ex div.* quotations. Business in the Water Companies was of larger volume than it has been for some little time of late. But the tendency was adverse; and the few variations in quotation which occurred were all for the worse.

The daily operations were: Business in Gas was very sluggish upon the reopening on Tuesday; but the tendency was in favour of firm prices. San Paulo advanced ½, and Buenos Ayres ¼. In Water, Kent fell 3. Wednesday was an even quieter day still for Gas business; and quotations remained unchanged. In Water, Chelsea ordinary and East London 4½ per cent. debenture receded 2 each. Thursday was a little more animated; but business still remained below the normal level. Gaslight ordinary advanced ½, and Buenos Ayres ¼. Friday's figures were steady; and no change in price took place. Saturday was dead-quiet; and all quotations closed unchanged.

ELECTRIC LIGHTING MEMORANDA.

Successful Telegraphy Without Wires—Testimony of Professor Fleming—Speculations—The Nernst Lamp Criticised.

It would be unfair to a very clever and persevering worker in electricity to omit to record here that the chief matter of interest in things electrical this Eastertide has not had anything to do with the lighting branch, but has belonged to the senior department of telegraphy. It is a very remarkable thing that after so many years of the practice of this application of electricity, the eyes of the world should be drawn to yet another method of electrical signalling—the Marconi wireless system. Experiments have been going on for many years with the object of making the etherial waves, which certain forms of electrical apparatus were known to be capable of exciting, to correspondingly affect receiving apparatus at a distance. Such, stripped of all technicalities, is the problem of wireless telegraphy. Mr. W. H. Preece has had a hand in this endeavour; but he could not make a practical "receiver." A working success in this regard was reserved for the young Italian, Signor Marconi, who has made a "ridiculously simple" apparatus, which, with the important addition of a long vertical air wire, has rendered possible regular and reliable wireless electrical signalling across the Straits of Dover. Professor J. A. Fleming wrote in "The Times" of the 3rd inst. a candid and lucid appreciation of this triumph of Marconi's—the first, by the way, that has come from any man of science of the highest rank. When the Marconi system was first heard of, the fame of the young Italian was blown up in some quarters in the hasty and somewhat vulgar manner that reminded sober people unpleasantly of the Edison craze. Consequently, those who did not want anybody to tell them that there were such phenomena as etherial waves were disposed to set Marconi down. They found that his sole contribution to the practical solution of the problem of utilizing etherial waves for signalling purposes was a so-called "coherer," which was not a new kind of instrument in itself. The Marconi "coherer" might, or might not, be found better than others; but its invention was not held to entitle Signor Marconi to all the honours of pioneership in the application.

Doubtless, also, professional jealousy is easy to arouse in regard to the practical adapter of other men's knowledge to some novel and useful purpose. The men who know should not be jealous of the men who can do; but they generally are. Sir Humphry Davy's jeering inquiry as to whether the pioneers of gas lighting thought of utilizing the dome of St. Paul's for a gas-holder discloses this weakness of humanity in the high places of science. So Marconi, with his improved "coherer" in his hand, was left to do his work without a word of encouragement from the high priests of the modern scientific Pantheon. Now he has done it, and Professor Fleming asks, with reason, that the fact should be acknowledged and put to his credit. Marconi freely admits that his system of telegraphy is founded on a basis of science to which he did not contribute. What he has done in the shape of building up a work-a-day superstructure on the discoveries of Hertz and others has enabled that to be effected which had not been done before—the sending of intelligible messages through the ether, from France to England. It is unnecessary to describe here either the principle or the experimental embodiment of the Marconi system of etherial telegraphy. Ample information of the kind has been published in the newspapers the last few days. The fact to be chronicled is that, as Professor Fleming says, "messages, signals, congratulations, and jokes were freely exchanged between the operators sitting on either side of the Channel, and automatically printed down in telegraphic code signals on the ordinary paper slip at the rate of 12 to 18 words a minute. . . . No familiarity with the subject removes the feeling of vague wonder with which one sees a telegraphic instrument merely connected with a length of 150 feet of copper wire run up the side of a flagstaff begin to draw its message out of space and print down in dot and dash on the paper tape the intelligence ferried across some 30 miles of water by the mysterious ether."

Of course, inasmuch as Marconi signals are made literally "in the air," from the top of a pole, the effect produced is like that of the radiation from a light-source—that is to say, it is spherical. Consequently, all receiving instruments within the sphere of influence of a signalling instrument are affected by it. No state of the atmosphere, neither darkness nor storm, affects the transmission. The range of the signals has been ascertained to vary as the square of the height of the rod. A wire carried to a vertical height of 20 feet will effectively signal over a radius of 1 mile, 40 feet high 4 miles, 80 feet 16 miles, and so on. This statement offers a promise of additional usefulness for lofty gasholders. Actually, The Gaslight and Coke Company could signal from one of their stations to another without troubling about a wire connection. It must not be supposed, however, that wireless telegraphy is competent to take the place of telegraphy by the aid of wires. The spherical distribution of the energy in the etherial system is an obvious waste and drawback, except for certain applications. If a system of Marconi signalling were established at St. Catherine's Point or Ushant, it would be no drawback, but the reverse, for all the warnings to "Keep away from here!" to be heard by every ship in the Channel. Without wasting time in speculation over possibilities, it may be concluded that the Eastertide that has just passed has been made memorable by the first practical etherial signalling over a long distance by the Marconi system.

After Mr. Swinburne's sensational Society of Arts performance, the quiescence of the friends of the Nernst electric lamp is almost uncanny. It is reported that a trial of the Nernst lamps for street lighting is being arranged for at Berlin, by the Company owning the German patent; but we have not been promised anything of the kind in this country. A severe criticism of the lamp, by an American electrician, has been published in the "Electrician." According to this communication, there is likely to be a lively dispute over the question of priority of this invention. The Nernst lamp is declared to have a "past," which may seriously depreciate the commercial value of its future It is even alleged that the lamp itself is worthless as a practical illuminant; but this seems to be going a little too far in the way of condemnation. Mr. Swinburne is not usually a sanguine advocate of any cause he espouses. Indeed, to anyone who does not know his reserve strength, he appears to understate his cases. We must continue to believe therefore that Nernst has succeeded in producing a novel and effective kind of electric lamp by a very interesting method; and it will be worth waiting to see what effect the invention will produce upon the business of electricity supply.

Eastern Counties Gas Managers' Association.—The twenty-first general meeting of this Association will be held, by permission of the Mayor, in the Council Chamber, Cambridge, on the 19th inst., under the presidency of Mr. W. D. Child, of Romford. According to the programme issued by the Hon. Secretary and Treasurer (Mr. J. H. Troughton, of Newmarket) the members will assemble at "Ye Olde Castel Hotel" at one o'clock for luncheon, and afterwards proceed to the Town Hall. The business will comprise the presentation of the Committee's report for the past year, with the accounts, which show a balance of £38; the reading of a paper by Mr. T. A. Guyatt, of Ely, on "The Hydraulic Main and its Fittings;" a paper or the opening of a discussion on "Purification" by Mr. A. L. Clarke, of Maldon; the election of officers; and the consideration of a suggestion to admit associate members. After the meeting, there will be a visit to the gas-works; and later on a dinner at the hotel.

AUDITORS.

(*Concluded from p.* 854.)

We have confined our attention to, and drawn our instances from, the accounts of gas undertakings in the Metropolis, not because we think they are any less efficiently audited than the generality of large trading companies, but rather because criticism is usually more useful if it be particular rather than general in its aim, and because the readers of the "Journal" are especially interested in, and acquainted with, the working of these companies. We, however, do not hesitate to assert that the same vital weakness to which we have throughout called attention renders more or less valueless the certificate attached to the balance-sheets of nine out of ten public companies. This weakness, we must, at the risk of incurring the accusation of repeating ourselves, again point out, lies in the *unqualified* reliance placed, at some stage or other in the process of auditing, upon the certificate of the very servants against whose possible dishonesty the whole purpose of auditing is directed. And the larger the company the more closely does the stage in the accounts at which the certificate is accepted approach the final, and the more meaningless the audit.

It may then fairly be asked whether it is possible to devise any system of auditing the accounts of companies of such magnitude as those we have instanced, which shall be really effectual for its purpose, and which is practicable within the limits of time and money usually expended thereon. Having given, we trust, every occasion for such a question to be asked, we hope to show that such an audit is both possible and practicable, not perhaps within the bounds of time and money which are now, but certainly within those which should be, devoted to the work in question. For first of all, it is necessary to put to the body of shareholders generally the question whether they are prepared to pay a fair and proper amount for an auditors' certificate which will really mean that they can rely upon the accuracy and straightforwardness of the accounts laid before them. If they are not, then they had much better keep in their pockets the money that they at present pay for a certificate which, in most cases, is evidence merely that the auditors have spent a certain number of days at the offices of the companies, and have performed a few harmless evolutions amongst the books and accounts. But assuming, as we have little doubt, that shareholders would be willing, if necessary, to pay a higher price in order to obtain the safeguard of an audit worthy of the name, we will endeavour to point out how a satisfactory and efficient audit might be adopted in practice.

First we have to consider what qualifications auditors should possess, in addition to those of a certain holding in their company and time to devote to the duties of the office. The fundamental requirement of an auditor, over and above the foregoing, and in addition to the unimpeachable uprightness which is a *sine quâ non*, is, we hold, a thorough and detailed knowledge of the whole system on which the accounts he has to audit are kept. And by this we mean, not merely a knowledge of how the figures in the final books are derived from subsidiary books and welded together, but also of the source and meaning of every entry in every book which forms a material link in the chain leading up to the final entries in the balance-sheet. Only by the possession of such knowledge will he be able to really test the accuracy and the straightforwardness with which each and every part of the whole has been constructed and put together.

We are afraid that very few companies' auditors—even after many years examination of the accounts in the accustomed fashion, much less at the time of their appointment—possess this most essential qualification; and it is this primary deficiency in their equipment that gives to even such examination as they do undertake a superficial and unsatisfactory character. We are led to the conclusion that only such men as have had years of experience of the system on which the books are kept of the particular (or analagous) classes of company which they are called upon to audit, are really qualified for the work. The only possible alternative is the appointment of chartered accountants, who, by their training, are better qualified than other men to grasp the details of a business with which they have had no previous acquaintance. But, unless the present system be materially amended, we decline to put any practical value upon the signature of any auditor, whether amateur or professional.

Hypothecating auditors of the necessary qualifications, we have to define the guiding principle upon which an audit should be conducted. It will be observed that we have, throughout, used the expression "take steps to *test* the accuracy of" this or that figure. That is the basis upon which we should found our whole system of auditing. Instead of a stereotyped method of merely examining regularly the few final books, and seeing that the subsidiary books are duly examined and certified by members of the staff, we would, in addition to such routine, adopt a plan of occasionally (at irregular, though at as short as possible, intervals) sampling the accuracy of every book or return which in any way formed part of the system of accounts. Under such a system no member of the staff of a company, from the lowest to the highest, would ever know whether or when any or every entry he made might be examined by the auditors. This is only applying, on an extended scale in a large matter, the system already in vogue on a small. Omnibus conductors never know when their buses will be boarded by road inspectors. They have, therefore, to be always certain that their tickets and waybills will bear auditing. So it should be with every day-book keeper, every ledger-keeper, every storekeeper, collector, or other such servant in the employment of a company.

For example. Under this system the auditors of a gas company would, occasionally—at some time only previously known to themselves—visit the works of the company, and check approximately (or have checked under their supervision) the stocks of coals, residuals, or principal stores; compare these stocks with the figures returned to them by the works manager; and check, from outside sources, or from contracts approved by the directors, the book prices put upon them. At the same time they could observe and compare with the book figures the prices being charged to the public for residuals sold for cash. Again, at another time they would call for one of the consumers' ledgers, examine, on one page here and another there, the charges for gas consumed with the meter-index returns, see that the cash for such accounts as had been paid had been properly accounted for, that only a normal percentage of the accounts showed at the commencement of a quarter more than the amount for the previous quarter as unpaid, test the castings of the ledger, and see that the totals were properly carried into the summary books. The summary books would from time to time be tested for additions, and in due course checked into the final books. The same principle, applied throughout the system, so that the staff would be always wondering what their auditors might ask for next, would make auditors the terror instead of the laughing-stock of dishonest servants, and would check, by the wholesome fear of discovery, any desire to falsify or manipulate the accounts.

It would be easy, had we space, to show, but we think it will readily be seen, that this plan would, if adopted and properly carried out, render certain the discovery, or, in most cases, the prevention, of such irregularities as we have indicated as possible under the present system. We believe that some such plan of check will be found to be in force in most well-managed companies, whereby each section of the staff is more or less checked by another. But, however it may satisfy the directors and head managers as to the correctness of the accounts, of the existence of such a plan auditors can have no satisfactory proof. Nor would such proof relieve them of one ounce of their own responsibility, because it would still leave untouched that possibility of collusion and conspiracy among the servants, of which we have recently had so striking an example. It would also leave undiminished the fundamental weakness of the present system which we have repeatedly emphasized—that of auditors, while attempting to fulfil their duty, putting faith in the honesty of any section or member of the staff.

We may further illustrate our view of what is, and also of what should be, the system of auditing by a reference to the procedure adopted by Parliament for the checking of the honesty of the Metropolitan Gas Companies in respect of the illuminating power of the gas supplied. The candle-power of the gas sent out by the Companies is frequently and regularly examined personally by public officials, whose duty it is to see that the statutory obligations of the Companies in this respect are fulfilled. On the strength of their personal testing of samples of the distributed gas, and on that alone, the testers base their reports as to whether the bulk of the gas supplied is of standard illuminating power; and we contend that the personal sampling of the accuracy of all the materials from which a balance-sheet has been constructed is the only method which can justify an auditor in certifying it as correct.

A certificate based upon such a system of auditing as we first outlined is of precisely as much value as would be that of the official gas-testers if, instead of themselves actually making the photometrical tests, they confined their attention to merely checking the final calculations based thereon, and accepted the certificates of officials of the Companies for the accuracy of the candle-power readings, the rates of consumption of sperm, the temperatures, and barometrical pressures. What would such a certificate be worth, and what would be said of the Gas Referees if they adopted such a method of procedure? What would then be said of the Referees may fairly be said now of auditors who are satisfied with the system on which the accounts of many companies are examined. But we have indicated a system of "book testing" which, if applied in an intelligent manner by men of the necessary knowledge and experience, would, we believe, be of equal practical value to that adopted for the testing of gas.

As to the practicability of adopting such a comprehensive scheme in the case of large companies, we have no doubt. It would, of course, entail a considerable deal more time being given to their duties by the auditors than is given now; and this would necessarily entail some increase, although, we submit, not a proportionate increase, in their remuneration. The three Metropolitan Gas Companies at present pay their Auditors about £800 a year. For say £1200 a year more, making a total charge for auditing of one-seventieth of a penny per 1000 cubic feet of gas sold, we think that the shareholders of these Companies might ask and expect that their accounts should be audited in some such adequate manner as we have outlined.*

* As to the Auditor of the Metropolitan Gas Companies appointed by the Board of Trade, we have said nothing. His duty is to satisfy Parliament, and not the shareholders; and if Parliament be satisfied, that is all that is required of him.

If this attempt to demonstrate the futility of the present, and to suggest the possibility of an improved, system of company auditing leads to nothing further than a corrected estimate by the average shareholder of the value of auditors' certificates, we shall have achieved some measure of success; but we hope that it may be the means of sooner or later inducing him to insist upon getting something rather than nothing for his money.

THE STOCK EXCHANGE RECORD OF MUNICIPAL TRADING.

THE Parliamentary Paper giving the particulars of the reproductive undertakings of Municipal Boroughs in England and Wales has already been mentioned in these columns. Further information on the same subject is contained in the new issue of the Stock Exchange "Official Intelligence." One of the useful Reprints of Special Chapters of this publication, which is edited by the Secretary of the Share and Loan Department, contains an account of "Municipal Trading in Relation to Gas, Water, Electricity, and Tramway Undertakings." This particular reprint should be in the hands of all those who are interested in the general subject—a great and growing multitude. It is not so long ago that the question of whether a Local Authority might fittingly embark in this or that enterprise outside the beaten track of local government, albeit important enough to those whom it concerned, appealed to few public men and touched but local and limited interests. At the present day it fills the newspapers, and constitutes a main "plank" of a popular political "platform." The members of the Association of Municipal Corporations talk of little else than municipal shopkeeping; and a recent conference of "Socialist and Labour Elected Persons" held in Leeds, under the presidency of Mr. Sidney Webb, of the London County Council, blessed the movement. A necessary preliminary to any useful discussion of such a subject is knowledge of the facts. This condition would not prevent a Trade Union Congress from essaying to dispose of the question by resolution; but that is not the way to advance any movement. The serious student will first ask for the evidence of the extent to which Municipalities have already gone into business, and, secondly, how they fare in it. If he should go on to inquire how the practice affects the communities served by the Municipalities, he will go on a far quest indeed.

The "Official Intelligence" cites the Local Taxation Returns for England and Wales, to show that the Local Authorities have an outstanding debt for the four kinds of directly remunerative undertakings—gas, water, electricity, and tramways—of £69,428,854. Besides these, the Local Authorities perform many other public services which produce revenue, if not actual profit. This category includes markets, canals, harbours, &c. The municipal appetite has grown with the eating. The Municipal Corporations desire to embark in many more industrial enterprises. A striking instance of this tendency is furnished by the recommendation of a Sub-Committee of the Glasgow Corporation Finance Committee to the Town Council, that parliamentary powers should be sought for the establishment of a Corporation Banking Department. It is proposed that the Corporation should be enabled to issue notes to a limited amount, payable in gold on demand. Against these notes, the Corporation would hold not more than one-half the amount of the issue in circulation at any time; the other half being secured by the surplus assets of the city. Furthermore, the suggestion is for the creation of a borrowing department, where the citizens could "deposit and withdraw moneys on such terms as to interest and dates of withdrawal as may be arranged from time to time." Why not?

The truth is that there has arisen a strong impulse in the direction of municipal trading, which originated in various sources that have united in a common stream of tendency. First among these the "Official Intelligence" rightly mentions the largely increased and constantly increasing burden of local taxation, which has inspired the Local Authorities responsible for it with a desire to afford some relief to the ratepayers by the establishment or acquisition of reproductive undertakings. Next comes the inefficiency, in many cases, of the services supplied by private companies, "owing principally to the inadequate provision made to meet the increased demands resulting from the development of the areas under supply." Other causes assigned are the encouragement offered by modern legislation to the municipalizing process; and the arising of higher ideals of civic responsibility. It is remarked that the particulars compiled in the "Official Intelligence" respecting the "establishment or acquisition, working, and progress" of municipal trades are given for what they are worth as testimony of the facts. "While no attempt has been made to determine how far the municipal working of these undertakings, generally, has been attended with success, such information has been given both in the tables and in the preliminary observations as will, it is hoped, enable those using them to arrive at a conclusion upon the subject." But this, with all deference, is just what no statistical information can do, unless the power of drawing a sound induction previously exists in those into whose hands the tables may come.

The Editor is mindful of this consideration. He is careful to point out that, in order to form a completely accurate opinion as to the success or failure of any undertaking, "it is necessary to proceed upon more extensive lines than a mere comparison of income with expenditure." Everything, indeed, depends upon what is taken into consideration. "Regard should be had to the price charged for the commodity or service supplied, and to any exemptions from charge or to any privileges accorded to the customers of the undertaking, to the quality or standard of the commodity or service, to the circumstances of the locality, to any assistance given to the undertaking from the local rates, and also to special circumstances under which the undertaking may have been established or acquired by the Local Authority."

The question of what is "profit" is to be answered differently for municipalized and proprietarial undertakings. This is a point, however, that need not be dilated upon here. It is significant that the first place in the list of remunerative municipal undertakings is given by the "Official Intelligence" to gas-works. In recounting the manner in which the Corporations became possessed of this description of property, it is pointed out that prior to the passing of the Public Health Act, 1875, a Local Authority for an urban area in England and Wales had no statutory power to provide gas-works. Even by the Act, the power given for the purpose was strictly limited, so that in the majority of cases the procedure has been by Special Act. Out of all the municipal gas-works included in the list, numbering 57, only one was established by the Corporation owning it. By far the greater number of these—47, to be precise—actually "trade," in the sense of supplying consumers beyond the municipal district; and 26 of them charge a higher price in the outlying areas. The "Official Intelligence" is somewhat heedless of principle in stating what the Municipalities do with their gas revenue. It recognizes that Aberdeen and Glasgow do not make a "profit," but misses the point that there is a principle underlying these facts. It is recorded that in 43 cases the rates are subsidized out of the gas profits, while in 12 instances every penny of net profit went in this way.

With regard to municipal water supply, of which there are upwards of 500 examples in England and Wales, it is made to appear that the business is usually a profitable one, whatever the motives which instigated the enterprise. Moreover, there are few cases in which the limits of the corporation water supply do not extend beyond the municipal boundary—more trade! Of course, where this is done it is not performed for the sake of philanthropy or the public health. When the conditions of the municipal supply of electricity are recounted in their turn, the opportunity is taken for showing that Parliament has learnt the wisdom of putting a limit upon the profit-making powers of Local Authorities carrying on this business; everything beyond 5 per cent. on the aggregate capital expenditure being required to be applied in the reduction of the price of current. In connection with the subject of tramways, it is remarked how anxiously the Legislature at first prevented Local Authorities from working tramways, and how generally the prohibition has been relaxed—mainly by the desire of the populations served by the lines. The example of Glasgow is cited as typical of the changed spirit of tramway administration. Whether for good or evil, the practice of devoting the tramway profits to the relief of the rates has followed municipalization in the majority of cases.

A distinct chapter of the "Official Intelligence" deals with the important subject of Municipal and County Finance. It is stated by way of introducing the subject that, though the past year was not productive of any public legislation in this regard, several private Corporation Bills contained financial proposals worthy of note by reason of their comparative novelty and of their dealing with a question which has recently attracted much attention from Local Authorities. For instance, both the Nottingham and Glasgow Corporations were authorized to establish insurance funds for their corporate property. The Corporation of Dundee, it is noted, have power to insure themselves also against defaults by officials. It is pointed out that self-insurance by a Municipality is an undertaking of questionable expediency, open to the great objection that the area of operation would not be sufficiently wide to permit the law of averages to take effect. The subject of rating and valuation closely touches that of Municipal finance, and accordingly the "Official Intelligence" makes passing mention of the work of the Royal Commission on Local Taxation. The labours of the Commission have already brought into prominence the complexity and anomalies of the existing systems of valuation and collection of local rates in England and Wales. The principal points to which attention is drawn are: The variety and number of the valuations, the absence (outside London) of any provision for the compulsory revaluation of properties and of any statutory scale of deductions from the gross estimated rental for determining the net annual or rateable value, the disparities in practice of the different assessment authorities, and the over-lapping of the areas of rating authorities, with the consequent duplication of the machinery of rate collection. Under the existing system, the valuation area is the Poor Law Union; and the valuation upon which the greater part of the local rate is raised is that made for the purposes of the poor-rate. This valuation area was formed without respect to county, borough, or even parish boundaries. There is more uniformity in the Administrative County of London; but outside there is chaos. Yet in many of these regions the money contributed to the Local Authority as payment for gas, water, and other commodities and services is applied to the subsidizing of rate-funds which have no natural or logical relationship to these sources of revenue! Perhaps, when the Royal Commission has reported, and parliamentary

effect has been given to their recommendations, the favourite municipal practice of taxing Peter in aid of Paul may be freed from some of the existing anomalies of the system, which make it very doubtful how much Paul really gets of what Peter only too certainly pays. But the fallacious process will still go on, if only because the preference for indirect taxation is apparently an incurable weakness of municipal humanity.

THE MANURIAL VALUE OF SULPHATE OF AMMONIA.

REFERENCE has already been made in the "JOURNAL" to the agricultural experiments which have been carried out for several years on Lord Rosebery's estate at Dalmeny, with the object of testing the value of various kinds of manure. We learn from "The Times" of yesterday that the tabulated results of last year's trials have been completed by the Agent of the estate, Mr. A. L. Drysdale, under whose skilled direction the experiments have been conducted, with the co-operation of Mr. John Hunter as Scientific Adviser.

Pending a fuller notice of Messrs. Drysdale and Hunter's valuable labours which we hope to give when the report appears, we record with satisfaction the fact that sulphate of ammonia comes out well as a manure. Dealing first with wheat unmanured after potatoes, following oats, we find from "The Times" that out of eight plots one was unmanured, to serve as a reference plot, and the seven others were all differently dressed. The best yields of wheat were obtained upon two plots which had given respectively the best and the worst yield of potatoes during the preceding year. In the former case, the potato crop had been manured with 4 cwt. of superphosphate, 6 cwt. of lime compost, and 2 cwt. of sulphate of ammonia per acre; in the latter case with 4 cwt. of superphosphate, 3 cwt. of sulphate of potash, and 2 cwt. of nitrate of soda. Barley, after turnips, was grown under twelve different conditions as to manuring; and the general result is to indicate the superiority of sulphate of ammonia over nitrate of soda as a source of nitrogen —the former having produced not only a heavier yield per acre, but a much superior malting quality of grain. In trials with clover hay, 30 lbs. of broad clover seed per acre were sown with oats following turnips, and ten different manurial dressings were separately employed. Here again the superiority of sulphate of ammonia over nitrate of soda was demonstrated, as regards both the bulk of the produce and its quality. Applications of lime, magnesia, and potash were also effective in increasing the feeding value of the crop, as ascertained by analysis. It was found, however, that where the soil was previously well dunged, and possessed a sufficiency of mineral fertilizers, no application of artificial manures was required by the clover crop. Considerable use was made of lime in the various manurial dressings; and it was applied throughout in a mechanically-ground condition with the object of securing uniformity of distribution in the soil. The main idea kept in view in the case of lime is that the annual or biennial application of from 4 to 5 cwt. per acre of ground lime provides material that can be utilized by the bacteria in the soil. Without it the nitrifying organisms cannot properly discharge their functions, and the sulphate of ammonia cannot undergo the changes resulting in the formation of nitrate of lime—a compound directly available as plant food. When this small dressing of lime is provided, the sulphate of ammonia is found throughout to give superior results, when compared with nitrate of soda. In the case of cereals, moreover, the crop is less liable to lodge with the lime and sulphate of ammonia dressing than with the nitrate of soda dressing.

We also learn from "The Times" that sulphate of ammonia had done well in some experiments carried out by Professor Somerville at Cockle Park. His investigations were directed to the determination of the efficacy of the new bacterial powder "alinit," introduced about a year ago by a firm of German manufacturing chemists, who claimed that the inoculation of the seed of cereals with it rendered the use of nitrogenous manures unnecessary. A plot of oats was treated with the material; the result being that the yield was raised from 3 to 8 bushels per acre. That the substance has failed to act as a substitute for nitrogenous manures is, however, inferred from the fact that upwards of 30 bushels per acre were got from an adjoining plot receiving 1¼ cwt. of sulphate of ammonia and 2 cwt. of superphosphate.

PERSONAL.

The Directors of the High Wycombe Gas Company have increased the salary of Mr. J. F. WICKS, their Manager and Secretary, by £50 per annum.

Alderman ROLLASON has been appointed Chairman of the Gas Committee of the West Bromwich Town Council, in succession to the late Alderman Farley.

The Board of Trade have appointed Mr. A. P. TROTTER (at present Government Electrical Engineer for Cape Colony) to be Electrical Adviser to the Board, in place of Major Cardew, who has resigned.

Mr. E. M. EATON has agreed to accept the position of Consulting Engineer for the Geltsdale water scheme of the Carlisle Corporation. He is to be retained until the Castlecarrock reservoir is filled with water; and his terms have been accepted by the Special Committee of the Corporation.

At Blaenau Festiniog, the resignation of the Gas Manager, Mr. Blair, has been received with much regret by the District Council, who have offered the appointment to Mr. T. HUGHES, who has been in the employ of the Authority for 19 years. Mr. Blair, it has been already reported, goes to Haddington.

The salary of Mr. S. MEUNIER, the Gas Engineer of the Stockport Corporation, has been raised by £125 per annum; and that of Mr. T. BEDFORD, the Secretary, by £40 per annum—in each case from the 1st inst. At the meeting of the Council last Wednesday, at which these additions were granted, the Mayor spoke highly of the services rendered by both officials in their respective capacities.

OBITUARY.

By the death of Mr. JOHN WILSON, J.P., at Hexgreave Park, Notts., the Elland-cum-Greetland Gas Company have lost their respected Chairman. He had been far from well for about four months; and the end came on the 27th ult. The deceased gentleman was only 53 years of age.

Mr. B. P. WOOD, who for about half a century held the position of Secretary and Collector to the Holmfirth Gas Company, died on the 31st ult., at the advanced age of 88. He retired from the Company's service about ten years ago, but retained an interest in the undertaking till the last. At the interment on Monday of last week, the Chairman (Mr. B. Butterworth) and several of the Directors of the Company were present as a testimony of their esteem for the deceased.

We learn with regret of the death, on the 29th ult., of Mr. JOSEPH INGHAM, who for about eight years had held the post of Manager of the Ramsbottom Gas Company. He was only about 38 years of age. Death was due to pneumonia, after less than a week's illness. Prior to his appointment to Ramsbottom, Mr. Ingham was Assistant-Manager at the Bury Corporation Gas-Works. He was a Freemason, and by his characteristic affability and good nature had gathered about him a large circle of friends.

Mr. W. TAYLOR, who had been Gas Manager in Elgin for about 38 years, died on Tuesday last. He was born at Mosside, near Paisley, 56 years ago, and served an apprenticeship with the firm of Messrs. Hanna, Donald, and Wilson, gas engineers, Paisley. When he was appointed Gas Manager at Elgin, the undertaking belonged to a Company, and the price of gas was 10s. per 1000 cubic feet. The annual output of gas was then some 10 million cubic feet; it is now about 25 millions, and the price is 4s. 7d. Mr. Taylor was always anxious to keep his works abreast of the times, and was thus led to carry out many improvements. For the last twelve years of his life he also held the position of Water Manager in the burgh, in which capacity he engineered a new water supply. Deceased was a member of the North British Association of Gas Managers. He leaves a widow, but no family.

An old and valued servant of the Northampton Corporation has passed away in the person of Mr. HENRY ARMITT, Manager and Secretary of the Water Department, whose death occurred on March 31, after a long and painful internal illness. Mr. Armitt was a native of Northampton, and commenced work as a clerk at Blisworth Station, from which he was transferred to the Northampton Station. At the urgent request of the late Mr. H. B. Whitworth, who was then Chairman of the old Northampton Water Company, deceased accepted about 35 years ago the position of Secretary to the Company. On the purchase of the Company's works by the Corporation in 1884, Mr. Armitt was appointed Manager; and he held the office up to the time of his death. He leaves a widow and two sons, one of whom, Mr. H. T. Armitt, is Manager of the gas-works at Santiago. Mr. Armitt was very highly respected; and great sympathy is expressed with the family in their bereavement. The funeral took place on Tuesday last.

NOTES.

Net Protection for Blasting Operations.

It is sometimes necessary to conduct blasting operations for getting out the foundations of buildings, gasholder tanks, &c., in rocky ground in dangerous proximity to buildings. In such cases, a safety device similar to that described in the "Engineering Record," as used on Pennsylvania Avenue in Philadelphia, might be adopted. Here the blasts were covered with strong nets, heavily loaded, which have proved more satisfactory than the usual chained logs of wood or timber platforms. The net used is made up into mats, from 10 feet to 12 feet on a side. It is composed of 1-inch or 1½-inch hemp rope, woven closely by hand. Old, or partly-worn, rope is quite as useful for the purpose as new, while being more easily worked. At each side, the rope is looped over a wooden pole, and the loops are tied in groups of three each. A light derrick lifts the mats into and out of place; and they are weighted down round the edges with heavy stones. Strangely enough, though the nets lie close over the blast-holes,

the explosion does not move them bodily, nor even cut the ropes to any great extent. The comfort and safety of being able to carry on blasting operations on the usual scale without the ordinary accompaniment of flying pieces of stone must be considerable; while by this expedient an economical method of shifting rock is once more rendered available for situations where it would otherwise be unsuitable. On the other hand, in the interest of public security, the employment of the expedient, when once it becomes known, is likely to be insisted upon as a matter of due care and watchfulness.

Heavy Construction Works at the Great Central Railway Goods Station.

Some instructive points in factory and general works construction are mentioned in a description, given in "Engineering," of the New London terminus buildings of the Great Central Railway. The goods station covers a space of 36 acres, with 10 miles of sidings; and in the buildings and mechanical equipment of this extensive establishment many problems were met with and solved. A railway yard resembles a gas-works so far as it is a place for the handling of much heavy material. At the Great Central Station, the vast main entrance, 40 feet wide, is closed in a novel way by a "curvilinear steel lath revolving shutter, divided into two widths, with a movable pilaster in the middle, so that the whole of the opening is clear for traffic." The usual wicket in the gate is replaced by an independent entrance in the wall. All the gates are of this construction. In the details of the roofs, economy has been studied by the employment of the most ordinary and easily-obtained sections of iron; all the members being riveted. Forgings have been avoided as far as possible. The design of the large warehouse has necessitated some extremely heavy column work, in order to keep the floor space clear. The steel columns are built up of riveted plates. Their base-plates carry a load of no less than 706 tons; and when the weight of the footings and concrete is added, this means that the weight on the ground amounts to 808 tons at these points. The subsoil is solid clay; and the footings are so spread that the load on the clay is not more than 3 tons per square foot. Yet the weight upon the top course of footings is 15·4 tons per square foot—a load which we should think is rarely exceeded.

The Utility of Iron Strengthening for Concrete.

The utility of iron or steel reinforcements of mortar or concrete masses—that is to say, of the familiar device of burying metallic bars in concrete with a view to strengthening it—has been challenged. It has been contended that as mortar or concrete will not suffer an elongation of one-tenth of a millimetre without breaking, while the resistance of iron or steel for such a minute elongation is very small, the combination of materials can be of little or no real value. The criticism is plausible; and M. Considère undertook a set of experiments to meet it—communicating his results to the "Comptes Rendus." For this purpose he prepared direct tests of various mortars and concretes, using prisms of square section, 60 centimetres long and 6 centimetres side, in which were embedded iron wires or rods. Figures are given for a prism of mortar containing 433 kilos of sand per cubic metre, and containing three unannealed iron rods of 4¼ millimetres diameter. This was subjected to a bending stress of 78·68 kilos without breaking; and afterwards to 140,000 applications of bending strains of from 34 to 55 kilos. The elongation of the face in tension under the first strain was 1·98 millimetres; and subsequent examination did not reveal any fissures. Moreover, small prisms cut from the block after all the tests were practically as strong as the fresh material. By calculating from the observed deflections at different loads the resistance chargeable to the embedded iron, the author obtained figures which he believes to fairly represent the resistance offered by the mortar. He deduces from these results the conclusion that mortar, fortified by an iron core, can bear elongations twenty times as great as would determine its rupture without such strengthening. It is further suggested that steel rails are the best reinforcement for concrete walls.

The Improvement of Producer Gas by the Use of Oxygen.

The commercial possibilities of Linde's liquid air machine have been discussed by Herr W. Hempel. By liquefying air and then submitting it to fractional distillation, it is possible to obtain both the oxygen and the nitrogen in much more concentrated states, which are then capable of new applications. It has been stated by Linde that by the expenditure of a horse-power-hour it is possible to obtain a cubic metre of 50 per cent. oxygen. Very little use appears to have been made of this process as yet. Hempel suggests that as it is the presence of so much nitrogen in ordinary producer gas that prohibits its successful distribution either for lighting or heating in towns, the substitution of cheap concentrated oxygen for the air used in the producer might be an improvement. He has analyzed a sample of producer gas, and found it to contain 25·4 per cent. of carbonic oxide, 12 per cent. of other combustible, and 57·4 per cent. of nitrogen. If 50 per cent. of oxygen were substituted for the air in making this gas, the products would show nearly 46 per cent. of carbonic oxide, 23 per cent. of other combustible, and 23 per cent. of nitrogen. By the same means gas from a Dowson producer could be made up to 25·3 per cent. of hydrogen, 58·3 per cent. of carbonic oxide, and only 16·4 per cent. of nitrogen. Another use for 50 per cent. oxygen might be found in employing it to help the combustion of inferior fuels. The author points out that the market price of a fuel does not depend upon its calorific value, but is affected by other considerations. Gas coke and poor coal are very much under-priced in comparison with petroleum and coal gas. Heat for heat, at Dresden rates, coke fuel costs 2·03 as against 19·81 for coal gas. There does not appear to be any future for the application of oxygen to ordinary heating; but the author suggests that when the construction of very large gas-engines has been accomplished, the gas producers may be worked partly by concentrated oxygen.

The Measurement of High Temperatures.

Professor H. L. Callendar has discoursed at the Royal Institution on the measurement of extreme temperatures. This is a subject of great theoretical and practical interest, which is not the less fascinating on account of the difficulty of the observations involved and of the extremely conflicting nature of the results obtained by different observers and diverse methods of research. Attempts have frequently been made to determine the temperatures of the electric arc and of the sun, which may be taken as examples of the highest temperatures known to science. The results in both cases exhibit striking discrepancies. In the case of the sun, it is obvious that no terrestrial thermometer can possibly be directly applied. The only available method is to measure the intensity of the solar radiation, and thence to deduce the temperature by determining the law of radiation at high temperatures. The measurement of the intensity of the solar radiation is in itself a sufficiently intricate proceeding; but the greatest source of uncertainty lies in the second part of the investigation, which must be conducted upon hypothetical data. This step from the known to the unknown is described by the term "extrapolation;" and though justifiable in the circumstances, the process is capable of landing the inquirer in the most remarkable conclusions if there happens to be a flaw in his formula. It is incidentally remarked that the experimental range of the gas thermometer does not extend beyond 1200° C. Professor Callendar gave a table of deduced solar temperatures, which showed the lack of agreement among the experimentalists who have hitherto worked at the problem. This disagreement was referred to the incertitude of the measurements of temperature within the range of material thermometers. The experiments of Violle upon the fusion and solidification of platinum are mentioned by Professor Callendar, who does not, however, refer to the photometric aspect of Violle's labours. Various forms of high-temperature thermometers were described and criticized by the Professor, who thus led up to his own preference for a gas thermometer based upon the "transpiration" principle. This apparatus, in brief, is the exact analogue of an electrical resistance thermometer, in which the fine wires of the electrical apparatus are replaced by a graduated series of fine tubes. The galvanometer is replaced by a rheoscope, constructed after a pattern devised by Joule for a different purpose, which can be made to rival in delicacy the best modern electrical instruments. The pyrometer itself consists of a fine tube of platinum instead of a wire. All the details of the methods of observation and calibration are faithfully copied from the electrical apparatus; and the result, so far as the measurement of transpiration resistance is concerned, is equally satisfactory. Professor Callendar hopes that his instrument, besides achieving the more accurate measurement of high temperatures, may also throw light on dissociation, and on many other points which are at present obscure in the theory of gases.

Spons' Architects' and Builders' Price Book.—We have received from the publishers of the above-named work (Messrs. E. & F. N. Spon, Limited, 125, Strand) a copy of the twenty-sixth edition, which has been recently issued. The matter has been revised and extended, and includes complete specifications and estimates of electric light installations carried out by the author (Mr. W. Young). There are also divisions dealing with "Concrete," "Fireproof Floors," and "Granite." The subjects are arranged in alphabetical sequence, so as to facilitate reference; and there is an index.

Pipe-Laying Under Difficulties.—We learn from the "Engineering Record" that special pipe-laying methods have been necessary for the water-mains along the line of Pennsylvania Avenue in Philadelphia, in connection with the subway work now in progress. At one place two lines of 36-inch pipe had to be inserted in a 48-inch main, and bedded in the masonry arch of the subway, in order to keep below the street pavement. At another crossing, a 48-inch main was furnished with a special reduced pipe, 36 ft. 7 in. long, with a flat, horizontal surface on the top, and 18 inches higher on the bottom at the centre than at the ends. This peculiar shape was to permit the section to straddle the arch, and still allow room for the pavement. The difference of head due to the velocity in the throat and in the main was measured by mercury columns; and the loss of head due to the contraction was found to range between 0·018 lb. and 0·233 lb. with velocities in the throat of 4·5 to 16·38 feet per second. An interesting account of the work, by Mr. Allan J. Fuller, is given in the "Proceedings" of the Engineers' Club of Philadelphia for October, 1898.

COMMUNICATED ARTICLES.

EXPERIENCES WITH THE INCANDESCENT GAS-LIGHT.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

(*Continued from p.* 858.)

A matter of frequent remark, in connection with the subject of educational establishments, is that the sharp boys receive more attention than the dull ones. So much importance is now attached to passing certain examinations, that there is a tendency to think more of the securing of a large number of successful passes than of the individual advancement of every boy. Something of the same sort obtains in business. The "lines" that show a maximum return with a minimum amount of trouble are assiduously cultivated, and occupy the front place. But just as an apparently dull boy, by special attention to his peculiar temperament, can be trained to make a creditable show for the school, so there are certain lines of business, at first sight by no means promising, but which are capable, by special attention and care, of being developed into important branches. The one under consideration is of this class. As already remarked, it has not received general approbation in the profession. Yet those who have taken it up with energy and determination have every reason to be satisfied with the results already obtained. There are few who could claim to have foreseen, five years ago, the important position to be attained by this new method of lighting in our streets, public buildings, shops, and dwelling-houses.

The chief and most evident objection is the light and fragile nature of the hood or mantle, which must be preserved from strong blasts of wind, or from sudden jar or shock, and which therefore calls for considerable care in the matters of lighting, extinguishing, cleaning glasses and accessories, &c. But this is not everything. The consumer is led to think that all he has to do is to be careful about the mantle, and does not also understand that the burner itself requires a little attention. This is a trifling matter, but sufficient to make or mar the success of the appliance. The burner used is not a common batswing or fish-tail, but an air, atmospheric, or bunsen burner, as it is styled at different times. Its principle is well known to most gas consumers, and to all who use gas for heating. It is a sort of gas-injector, drawing in a certain proportion of air, and mixing it with the gas previous to combustion—in short, the usual form of burner adopted for utilizing the heating rather than the illuminating properties of coal gas. It is, however, a different thing from the rough-and-ready style of burner used in gas-fires, gas-ovens, and gas boiling-rings, in which strength and simplicity are rightly regarded as more important than strict scientific accuracy. These are practical, and not laboratory appliances. An important feature of the incandescent gas-light is that the burner should be scientifically constructed, to give a regularly-shaped flame that should properly fit the mantle. There is more in this term "mantle" than appears at first sight. The inventor of it was probably a married man, who had accompanied his wife to the milliner's shop, and knew from experience how particular ladies are in the matter of a good fit. That the mantle should be a good fit to the shape of the flame is of equal importance, only in this case the figure must be altered to fit the mantle, instead of the mantle being made to fit the figure. A flame of fixed dimensions being required, the burner must be accurately made, with delicately proportioned air-inlets, passages, &c.; and it must necessarily include small apertures of one sort or another. In all bunsen burners, the air aspirated or drawn in, and which is passing continuously from the point of admission to that of ignition, so long as the burner is in use, is apt to carry foreign matters, dust, &c., which may lodge and remain in some part of the burner. These are easily displaced by the air-spray apparatus, if used regularly at least once a week; but if allowed to remain longer, they may bake hard, forming a permanent obstruction that can only be removed by taking the burner to pieces. Obviously, a very small obstruction may exercise an effect on the shape of the flame that would be of no importance with the gas-fire or other heating burner, but yet may have a very marked result on the practical efficiency of the mantle.

These matters, and especially the first named—the fragility of the mantle—appear to unduly impress some who as yet have had no experience with the system. Though apparently of a serious nature to the eyes of the uninitiated, they become very simple after a little practical experience; and it is surprising how soon an ordinary workman will learn to handle the mantles and to employ the air-spray. A large number of gas users, especially gentlemen whose hobbies run in the direction of constructive or scientific pursuits, have already taken kindly to the system (having gradually educated themselves in the details just mentioned), and are employing it with satisfaction; and many others would do so if the whole thing could be clearly explained to them. But beyond these there is the large class who, for various reasons, desire to be saved as much trouble as possible. They want everything self-acting and ready-made; and already the line of "labour-saving" devices has been worked to a ridiculous degree. A cheap invention for taking a handkerchief out of one's pocket would probably sell by the thousand. These people talk about the "labour" of lighting an ordinary gas-burner; and the question of using an air-spray apparatus once a week to blow out the burner, is regarded by them as a great drawback. The only means by which they can be induced to take to the incandescent gas-light, is an efficient maintenance system; and the only persons who can satisfactorily carry out such a system are those who sell the gas.

Let us be quite clear as to what is meant by this. We have not hit upon a new line for adding to the profits at the expense of the gas-fitter. When gas companies took up the letting of gas-stoves on hire, there was a howl raised on behalf of the gas-fitting trade; the grasping gas company were going to take away the gas-stove trade. This cry was raised without regard to the fact that in many districts only a dozen stoves or so had been sold within ten years, and there was no trade to take. The profits of the hiring trade, such as they are, might be in the hands of the gas-fitting interests in two towns out of three, if they had chosen to take them; for many gas undertakings did not hurry into this branch, and did not take it up till pressed by their customers to do so. When we propose that the gas company should take up the maintenance of incandescent gas-lights, the same complaint will be made; and the "trade" will suppose that the gas company are entering into unfair competition with them, and seeking to take away their means of living. Ironmongers have repeatedly said to me: "It is no use our trying to sell gas-stoves when you supply them on hire;" and I know that they have not sold a total of half-a-dozen at any time. With regard to our maintenance scheme, there is yet time for the trade to adopt it. Very few gas undertakings have as yet moved in the matter; and they will not do so if others take it up in an active or efficient manner. My reason for saying that the gas companies are the ones to take it up is not because they will thus secure a profitable new line of business, but because the direct profits from it are not sufficient to induce private traders to do so. The gas companies have their position and their sales to look to, and should adopt the new scheme as a matter that will strengthen the one and improve the other, and not as a source of direct profit.

It must not, however, be a source of loss. The benefits arising from the introduction of a cooking-stove (which means a permanent addition of perhaps 500 cubic feet of gas per week to the demand) are so marked as to warrant some little outlay or loss; and so we find that a liberal policy in the matter of fixing, and so on, is in general favour. But the consumption of gas by a Welsbach burner is so small as to leave no margin for any "liberality." A No. 2 new-pattern burner, used from dusk to mid-night on every evening of the year, will consume something under 4000 cubic feet of gas. The profit on this quantity would not go far towards free fixing or anything of that sort. The consumer will not be likely to regard with favour any terms leaving a large margin of profit for the Company. The Welsbach Company have recognized this point; and a few weeks ago they issued a circular advising gas companies to undertake maintenance at cheap rates, and to supply mantles at less than shop prices. There is no limit to the eccentricity of the Welsbach Company. Not long since they required a written undertaking that the mantles supplied by them should not be sold at less than retail price; and by way of encouraging gas companies to adopt a liberal policy, and to enter into advance contracts for the supply of mantles, the circular above named was followed at the distance of a fortnight by a second, announcing an all-round reduction of discounts or rise of prices. So the gas company must go carefully into the matter, with a view of arriving at the actual cost of the service rendered.

The maintenance scheme may or may not include hire or hire-purchase of burners and apparatus; and the charge made can be inclusive of mantles, chimneys, &c., or otherwise—the accessories being supplied at the shop rates, if the latter plan is selected. In the case of outside shop lights, places of worship, and public rooms, the charge may include both lighting and extinguishing, according to an agreed schedule. I am not in favour of a fixed rate of so much per burner, because there is a great difference in circumstances, and no two cases come on all-fours with each other. In a place of worship, the consumption of mantles is so small as to be almost a negligible quantity; and the cost of cleaning glasses, &c., is also trifling, as there is a freedom from dust. The lights are used perhaps an average of six to eight hours per week; so that a mantle will last a year or more, and once a month will be quite often enough for a clean-up of chimneys and globes. Suppose there are sixty burners, a charge of 1s. per burner per quarter would mean £12 per annum, or more than twice the actual cost of service rendered. In a busy shop or factory, with plenty of dust and traffic, the consumption of mantles will average six to eight per burner; and they must all be attended to at least once a week. A charge of £12 per annum would thus mean a loss of £8 or £10. The public will hear more about the enormous profits in the first case than of the loss experienced in the second; so the better course is to take out the cost of the actual service required in each instance, and put in an estimate based as nearly as possible on the actual outlay. In dealing with ordinary consumers, a small charge per quarter, sufficient to cover cost of inspection and cleaning only—the said inspection and cleaning to take place, not once a week or once a month, but as often as is necessary to keep the apparatus in an efficient state—is preferable to an inclusive charge. The consumer gets a direct interest in looking after the burners, as he knows he will benefit by carefulness, or suffer from carelessness.

The majority will not figure upon the saving of gas that may be secured by the incandescent burner, but will regard the maintenance charge as an extra, like a meter or stove rent. One shilling per burner per quarter is a fair average charge to cover all expenses. But many consumers who have about twenty burners object to be tied down to a fixed charge of £1 per quarter, and think it extremely high, though they would pass an account for inspection and cleaning 5s., and mantles 15s., without any question.

The maintenance department requires so much and continual supervision that, except in very small concerns, it is too much for the manager to undertake in addition to his other duties. It should be placed under the control of a competent foreman or superintendent, capable of quoting prices to customers, of overlooking the staff of men employed, and of properly supervising working hours and materials used. He should also be able to deal with special cases. A place of worship, for example, lighted with ordinary flat-flame burners, can be completely fitted up on hire-purchase terms to extend over seven years, under a guarantee that the total cost of gas, hire-purchase, and maintenance shall not exceed the previous outlay for gas alone; thus affording a greatly improved light, with no initial outlay or increase in the annual charges. This offer is especially attractive if the fittings are old-fashioned, badly worn, or otherwise objectionable, and at the same time the trustees are not in a position to entertain the expense of a complete renewal. The foreman should be capable of preparing an estimate of the cost of fittings and labour, cleaning glasses, &c., and renewals of mantles; so he must have an accurate knowledge of gas-fittings and gas-lighting generally. If such qualifications are not to be found in the existing staff of the company, the defect should be remedied as soon as possible. At Salisbury, we have been supplying (on inclusive hire-purchase maintenance terms) outside shop-lamps containing one, two, or three burners each. These are kept in good order, and lit at dusk every evening, for a fixed charge per quarter; but extinguishing is not included, as the shopkeepers prefer a little license in this respect. Closing time may be at 8 o'clock; but the shop may be full of customers at that hour, and the sudden extinction of all the outside lights would quickly empty it. On the other hand, if things look quiet, and there is no prospect of business, the shopkeeper may like to put the lights out a quarter of an hour before time. It is therefore better to leave the extinguishing to the consumer. These are examples of special efforts to meet the requirements of customers, and as such represent the directions in which to work.

(To be continued.)

THE PORTABLE PHOTOMETER.

By "VERITAS."

Once more the London County Council, a body who might be advantageously rechristened "The Municipal Octopus," has extended one of its well worn feelers in the direction of the public gas supply, with the view of absorbing a portable photometer to assist its digestive apparatus.

It is perhaps somewhat fortunate, both for the Gas Companies and the public, that the whole wisdom of the London County Council with regard to the proposed legalization of the "Portable Photometer" is simply confined to the adoption of a recommendation of the so-called "Public Control Committee." It is quite superfluous on my part to express my appreciation of your able leading article of March 28 last, as I am quite certain that all impartial readers of your "JOURNAL" must appreciate its critical value, as well as the lucid description given of the course of modern agitation in the domain of gas testing. After reading your leader, I almost feel that it is unnecessary for anything additional to be said. At the same time, there are one or two details which require further explanation, and might possibly be provocative of discussion. I must apologize for criticizing, from my own point of view, the report of the London County Council apart from your leading article, while absolutely accepting all that you have said as honest and legitimate criticism.

Statistics are given showing that the portable photometer indicates results which differ to a large extent from the returns from the official certified testing-stations; and it is stated in the report of the London County Council Committee (quoting *verbatim*): "The Metropolitan Gas Referees are in full agreement with us on this subject, and are of opinion that testings made with a portable photometer, carefully and systematically conducted, would afford to the consumers of gas a more complete protection than a large increase in the number of testing-places; and state that they would be prepared to certify such a photometer as they have recently prescribed for use in the fixed testing-places, for testing gas in buildings outside such testing-place in the event of the testings made with the portable photometer being legalized by Act of Parliament." Now with all due deference to both parties, I cannot understand this view of the question—this quondam agreement between the County Council and the Gas Referees.

At the present time, no official testing can be used for the proper protection of the public without the whole apparatus and the conditions under which it is used being certified by the Referees. No testings are legal unless absolutely conforming to the conditions required—ventilation of photometer room, maintenance of a constant temperature by an elaborate thermostat, &c. How are all these conditions to be fulfilled should a peripatetic photometer be legalized, to be used everywhere and anywhere at the option of the County Council? and when the results are obtained, what criterion would they be of the average composition of the gas sent out by any particular gas company? Again, presuming that the County Council are authorized by Parliament to use the peripatetic photometer, tests made by this instrument must necessarily be legal. In case of a deficiency of illuminating power being discovered, would this authorize a prosecution of the gas company? Further, if the peripatetic photometer is to act as an arbitrator between the gas companies and the public, why not abolish the official testing-stations as superfluous? If they were still in evidence and the official testing-station returned say 17-candle gas while the portable photometer gave 15 candles—a result which would be quite possible—which figure would be regarded as correct? Again, with unlimited parliamentary powers to carry about a portable instrument to test gas at any point of the district, what limitations would there be in the location of testing? Would the average householder welcome an official of the County Council with an embargo of scientific apparatus in his dining room, possibly in the middle of dinner, with the object of taking a test of the gas and protecting the interests of the general public? I should consider that the language used on such an occasion would probably be unfit for publication.

TECHNICAL RECORD.

INFORMAL MEETING OF SCOTCH GAS MANAGERS.

Meeting in Glasgow.

The Sixteenth Annual Informal Meeting of Gas Managers in Scotland was held at the North British Station Hotel, Glasgow, on Wednesday last. There was a larger attendance than is customary. Mr. ALEX. YUILL, of Alloa, the Convener of the gathering, in whose hands all the arrangements had been placed, formally opened the proceedings at two o'clock, and moved that Mr. W. Ewing, of Hamilton, take the chair.

THE CHAIRMAN'S ADDRESS.

Mr. EWING at once did so, and proceeded to deliver the following address:—

Permit me to thank you sincerely for your courtesy in appointing me to the honourable post of President of this the Sixteenth Annual Informal Meeting of Scottish Gas Managers. I trust, should my efforts fall short of your expectations, that you will be "to my faults a little blind, and to my virtues very kind."

Gas manufacture remains very much as it was a year ago, there being no marked improvements to alter its general routine. The success of incandescent gas lighting still keeps electricity in the background as an economical light, although, more for the sake of being sole purveyors of light, corporations who are presently owners of gas-works will, sooner or later, have to supply the two illuminants, or allow a company to come in and supply electricity.

During the past few years, the gas managers of Scotland, by their economical methods of working, have enriched their respective towns—in some instances, by many thousands of pounds—by the sweeping reductions that have been made in the charge for gas, and this in the face of an unprecedented drop in the price received for residuals. Take, for instance, the price of tar and liquor at Hamilton in 1892 at 9s. 11d. per 100 gallons mixed, and compare it with the present price of 2s. 6d. per 100 gallons, and take our last year's volume of tar and liquor, which shows a drop in revenue of quite £3000. For fully five years the gas consumers of Hamilton have paid 2s. 1d. per 1000 cubic feet for their gas, and no meter hire; the former price being 2s. 11d. and a charge for meters. The total benefit to gas consumers during that time is £18,000, notwithstanding the fact that in 1892 there was a proposal to increase the price to meet the requirements. These figures do not represent the actual saving, as a comparison with the old and new methods of working shows that since 1892-3 the difference in volume of gas per ton of coal carbonized amounts to 96½ millions, which, taken at its selling price, is equal to £10,054; the increased volume of tar and liquor—825,000 gallons—taken at the average price, is £1856; and 10,000 tons of coke, £2375. There was also a proportionate saving of not less than £5000 in wages, in spite of the fact that the average wage per man is now 30s. per week, with a shorter day, against 25s. 6d. formerly. These figures represent a total of £37,285 in better working results during the six years; and without this improved working, the Corporation and gas consumers of Hamilton would have had to pay a very high figure for gas. There are other items, such as saving of interest, &c., which would very considerably increase the above sum; but this is quite sufficient to show one of the many instances in Scotland whereby the combined energies of a gas manager, backed up by an intelligent, hard-working Convener and Gas Committee, have given to the gas consumers a large sum in hard cash, which seldom receives the consideration it merits.

Gas cookers and fires have been greatly in demand during the past year; the year's bill in Hamilton amounting to about £1000 (which includes the fixing) for some 352 different kinds of gas apparatus. We use what is termed the "Hamilton" cooker, with tiles on hot-plates, which are principally used for scone baking. One pleasing feature in this department is that all classes of gas consumers have taken a large interest in cooking by gas. The inducements given by the Gas Department are the fitting up of fires and cookers free of cost where not more than 30 feet of pipe are required, and a rental charge for cookers of only 5 per cent. on the cost. Where corporations have a large number of cookers in use, I think it would have a tendency to preserve them if several money prizes were given yearly for the best-kept cookers. We find, as a rule, that consumers take quite as much care of a cooker as a kitchen range; and I know of several cookers at present in use where the greatest amount of care is taken to keep them in a high state of efficiency. The penny-in-the-slot cooker has not yet been taken full advantage of in Scotland; and I think that, by offering a little more inducement to consumers, in the way of fitting up a bracket, meter, and cooker free of charge, there would be quite a "boom" in both prepayment meters and cookers. This could be done without incurring much expense, and would be an advantage both to gas departments and a class of consumers who could only be reached in this fashion. We can take a lesson from our friends over the Border in this matter.

The present year will tell heavily on the finances of most Scotch gas-works, owing to the large increase in the price of coal, and the low returns from residuals. I anticipate that many gas-works will require to increase the selling price of gas. Recent coal contracts made by our Gas Department show an advance on local supplies of 43·75 per cent.; but with our usual working results, I am pleased to say that our present price, of 2s. 1d. per 1000 cubic feet, may remain the same, as an ample margin will be left to meet all requirements. To compensate for this large drop in the revenue, economy must be the order of the day; and with the exercise of this, backed up by the harmony between the Gas Committee, Manager, and employees which has always existed, there can be no doubt of the continued success of the Hamilton Gas Department, with hopes of a still further reduction in price.

The manufacture of sulphate of ammonia at gas-works is a source of profit, and prevents an individual company of tar distillers having the pull over certain districts, which I infer from the fact that last year we had only one offer in reply to our advertisement for the purchase of our tar and liquor. I would even suggest the distillation of tar at all works with a make of gas of over 40 million cubic feet, as the farther you go in tar distillation the more valuable it becomes. Since tar and liquor are profitable to the distiller, who pays heavy carriage in conveying it to his works, I would assume that a gas-works would profit largely in the saving of carriage alone on the manufactured article as compared with the raw material. Take, for instance, the probable amount of coal used at the Hamilton Gas-Works during the current year as 13,000 tons; and assume that 923,000 gallons of tar and liquor were made, 143,000 gallons of which would be tar, leaving 780,000 gallons of liquor at 4° Twaddel. It is understood that 3000 gallons of liquor of this strength make one ton of sulphate of ammonia; but by way of leaving a safe margin I shall take 3500 gallons, which would give 222 tons of sulphate of ammonia. The average price received per ton for sulphate during the past five years is £9 13s.; but take it at £9 10s., which leaves a margin of 3s. per ton, and gives the sum of £2109. Deduct from this £666, the cost of manufacture at £3 per ton (although Mr. Carr, of Widnes, by skilful manipulation, has made sulphate at £1 18s. per ton), and there remains the sum of £1443 as value for the manufactured article. In selling the 143,000 gallons of tar (the balance of product from 13,000 tons of coal) at the present market price of 9s. per 100 gallons, a sum of £643 10s. would be realized, which, added to the sum received for sulphate, represents a total of £2086 10s. We receive at present 2s. 6d. per 100 gallons for tar and liquor mixed. But, assuming that the 923,000 gallons were sold to the tar distiller in its raw state, at 3s. per 100 gallons, a sum of £1384 10s. would be realized; showing a balance in favour of sulphate manufacture at the gas-works of £702. Considering that the present price of sulphate is £10 10s. per ton, I think the above figures give a large margin of safety.

The emptying of spent liquor into the sewer system of a town seems to be objectionable to some people; but in my opinion it is an excellent disinfectant, and should not stand in the way of increasing the profits of a gas-works. Another source of increased profit in gas-works where there is head-room in coal stores, and where coal has to be carted into the works, is in the storing of coal from an inclined platform. Formerly at our works the price of storing and breaking cannel coal was fully 6d. per ton; but now, with a high level, it costs about 1½d. per ton, and about 1d. under favourable circumstances. There is also room for improvement in the manipulation of work and workmen in most retort-houses; it is there the profits of a gas-works can be made or lost. If we can make 9000 or 10,000 cubic feet per mouthpiece, why cannot that rate be kept up? The reason is the want of skilled supervision, as I always find that stokers endeavour to carry out instructions when properly given; and I am fortunate in having an excellent staff in my retort-house. At times one does meet a few whose efforts are to get done with their work as easily as possible; and these kind of men cost gas-works throughout the country many thousands of pounds per annum. But, again, a skilled superintendent should be able to keep such a schemer in his place; failing which, he is better outside. The following are a few tricks that are played by scheming stokers, which tell heavily on the working results: He will carefully select damp coal, if it can be had, charge his retorts 3 inches deep at back and 12 inches at mouthpiece. The mouthpiece will be carefully filled with perhaps three shovelfuls of coal. He will charge a retort without delay, with perhaps four dull spots, instead of closing the mouthpiece door to bring up an equal heat before charging. He will sometimes leave his producer empty; and in shaking the bars he will purposely forget to force down clinker from the top door of the producer, leave the bottom and top doors of the producer partly open, and then he will say his setting has low heats. This kind of thing is only too common in gas-works, but should not be tolerated for a moment. It is my opinion that, with careful stoking, many gas-works at present making about 6000 cubic feet per mouthpiece could get at least 9000 cubic feet; thereby saving 50 per cent. in labour, with an increased yield of gas and large saving in fuel. The index of our station-meter is taken hourly, so that any defect in production can at once be attended to.

Sunday labour in gas-works is often a bone of contention; and if I could find it suitable to partly do away with it, I would gladly recommend that it should be done. Perhaps those who have tried it may give us some information as to whether or not they find any inconvenience from leaking retorts, low heats, &c. Gas consumption in many places is now nearly continuous throughout the 24 hours; and I find that with 10-light meters, a revolution is often made between the surveys. I would therefore give a hint to meter makers, on the necessity of adding a fourth dial. From my experience, even 5-light meters should have an additional dial. We sometimes judge the quality of gas supplied to a town by what we see at railway stations; but my experience teaches me not to malign a gas manager from what we find there, as I have yet to see a properly lighted railway station. The burners used are of the ordinary type; and as a rule are only changed when completely done. If railway companies would only attend properly to this department, and use regulator burners, a large saving of gas would be effected and better light given.

Should you find food for a good discussion in the foregoing remarks, any little effort I have put forth will be amply rewarded in gaining further information on the subjects mentioned.

Discussion.

Mr. H. Pooley (Dunfermline) said that, ever since they had adopted the system of supplying gas-stoves, they had fitted up the stoves, brackets, and meters entirely free of charge. They found that it paid them, though not to the same extent as they would like. He thought that the practice in Scotland was to almost entirely use the griller; therefore, perhaps, it might be advantageous to give up the cooker and supply a good griller instead. Certainly it would be a great deal cheaper. They fitted up ordinary stoves entirely free, irrespective of the length of piping, and supplied gas for them at 7d. per 1000 cubic feet cheaper than for lighting; and they did not charge any meter hire for stoves. Their capital charges represented 1s. 9d. per 1000 cubic feet, which was within 4d. of Mr. Ewing's selling price; and this rather heavily handicapped them.

Mr. A. Waddell (Broughty Ferry) quite agreed with Mr. Ewing—and he thought it would be the experience of all present—that the public very seldom thanked a gas manager for anything he might do. In his own case, the price of gas had been reduced from 4s. 10d. to 2s. 11d. per 1000 cubic feet. At the place where he was previously, it was reduced from 7s. 6d. to 4s. 2d.; and he said there did not appear to be any disposition on the part of the public to say that anything had been done for their benefit, but rather that they were paying about the same price as before. He was sure managers were all feeling this year the increase in the price of coal, with the low returns they were getting for residuals. Capital charges in Broughty Ferry represented about 1s. per 1000 cubic feet; so that they were pretty well handicapped. But, like Mr. Ewing, he thought that, notwithstanding all these things, he should be able to pull through at the same price.

Mr. J. W. Carmichael (Barrhead) said that he had been very pleased indeed to listen to the address. Mr. Ewing was the envy of most gas managers, on account of the price at which he could sell his gas. Of course, he was very favourably situated, being in the centre of the coal district, which helped him very much. The hiring out of stoves and prepayment meters was, he thought, a very good thing for increasing the sale of gas. It enabled them, as Mr. Ewing said, to be generous to their consumers, and to do what they could to help them. The manufacture of sulphate of ammonia was brought up at last year's meeting, and was threshed out pretty well. He had then very great trouble in following particular gentlemen, simply because those who gave their opinions were mostly at sixes-and-sevens on the subject. It was a difficult thing for many managers to know whether they should go in for the manufacture of sulphate or not. His own opinion was that where they had an output of from 20 to 30 million cubic feet, they could work a sulphate plant to advantage.

Mr. W. Smith (Ayr) said he had listened with pleasure to the Chairman's address. In the matter of stoves, he found, from

experience, that it would be far the better way to sell them entirely to consumers, making the price as low as possible. He hired stoves as well. In putting in stoves, he always saw to there being a sufficient supply of gas, because he found the complaints very often arose on account of an ordinary plumber having been employed, who had just taken the gas supply from the nearest available source. He preferred to give an independent supply, passing through an independent meter; and consumers liked this too, because it let them know what gas they were consuming.

Mr. R. S. CARLOW (Arbroath) was not sure that he could say very much more than he said last year. Last year he put in about 400 prepayment meters; and this year there would be about another 400. He expected to have an increased output of gas at the end of May next of over 6 million cubic feet. This was owing to prepayment meters; and they would understand that it was a source of profit which they had not before. It must be remembered, too, that all the expenses—the burdens, cost of management, and everything else—were the same. He therefore looked forward to having a balance this year which would be very satisfactory indeed. In the matter of gas-stoves, he did not, like Mr. Ewing, give pipes and fittings free; but he charged exactly cost price, and the usual rent for the meters. The consumption of gas in stoves was another source of revenue to managers; and it was a business which they should push. They knew his opinion about sulphate of ammonia. The difference in the price could be easily accounted for. When he put up his works prices were very low indeed; but immediately thereafter chemical prices went up, and the price went up to the tar distiller, who had not put up the works. Therefore the Arbroath Corporation obtained a good price after putting up their works. Comparing present prices for tar and liquor with those given by tar distillers in the district, and considering the quantities of sulphate of ammonia, naphtha, and boiled tar made, he found that, at the very least, they had £500 clear profit—that was taking into account the price of tar and liquor mixed. He had no hesitation in saying it. He did not for a single moment regret the step he had taken. So long as he was getting his present return, he was perfectly satisfied.

Mr. A. WADDELL (Broughty Ferry) said he was sorry to find that Mr. Carlow's introduction of residuals plant had not raised their price for tar and liquor. Indeed, for five years their receipts from this source were 3s. 2d. per ton of coal carbonized. During the past year they had only obtained 1s. 10d.; so that they had not realized what Mr. Carlow indicated. He should have been very pleased to have had the profits Mr. Carlow spoke of; but with regard to the introduction of plant for working up residuals, he must say that their site was very small. It took them all their time to make what gas they required, without introducing other plant. Another reason against it was that they were surrounded on all hands by a class of houses the occupiers of which would certainly not permit anything being done which they might consider objectionable.

Mr. CARLOW: I do not think that can be any reason at all, because my works are right opposite the Episcopal Church.

Mr. WADDELL: It is not exactly what is your knowledge; it is what people round about you think.

Mr. W. HAMILTON (Kilsyth) said he thought he heard the Chairman say he gave his stokers 30s. a week.

The CHAIRMAN: That is the average for the workmen. Our leading stokers get 38s. 6d.; and others receive 36s. 9d. and 35s. The lowest wage for stokers is 35s. They work seven shifts of eight hours each.

Mr. HAMILTON said he had always heard that money was made or lost in the retort-house. Would it not be better to give the money which was made to the stokers? His were a small works; and he paid his stokers 30s. per week. They ought to pay the men the money, and not give it to the landlords by putting in pipes for them. In Hamilton, they had the lowest price in Scotland. Well, let them make the stokers the highest paid in Scotland.

The CHAIRMAN said that this was the case already. He paid the best wages to stokers that were paid in any gas-works in Scotland.

Mr. FORBES WADDELL (Forfar) said he had listened with a good deal of envy, and also with a good deal of pleasure, to Mr. Ewing's address—envy that he should not have been able to make such savings. Mr. Ewing had surely had some very bad stokers. He would not like to say that any stokers of his charged retorts 3 inches at the back and 12 inches at the front; though he agreed that if such men existed, they would be better outside the works, or never should have been in them. He was perfectly satisfied that Mr. Carlow had not in the least exaggerated his profits from sulphate; and he thought it would pay himself very well indeed to have a sulphate plant, even if he only realized half the profit Mr. Carlow did. But, unfortunately, he had to say, with his brother, that he had not experienced the benefit Mr. Carlow was inclined to think they had on account of Arbroath having gone in for sulphate manufacture. The year before Mr. Carlow adopted it they were getting for tar and liquor 2s. 7d. per ton of coal carbonized. Last year, when they took in offers, with sulphate of ammonia at something like £7 10s. per ton, they were offered for tar and liquor 1s. 5d. per ton of coal carbonized. Thinking this not enough they delayed; and, though sulphate had risen to £9 10s. per ton, they only obtained 1s. 7d. He had not heard of anyone in the district benefiting in the slightest from Mr. Carlow's having gone in for sulphate manufacture; and consequently, he thought, everyone should go in for it himself.

Mr. W. HAMILTON: What do you obtain per 100 gallons? That is the best way to calculate it.

Mr. WADDELL: We had alternative offers; but the contractor had apparently based both offers on the return per ton of coal carbonized.

Mr. T. D. HALL (Montrose) thought it would be beyond him to add anything new to the discussion. He had listened with very much pleasure to Mr. Ewing's paper. He could not exactly follow the figures as he would have liked to have done; but he had no doubt that his paper would make interesting reading, when they got it in print. From what he could gather, Mr. Ewing seemed to show a very rosy side of affairs indeed; and he hoped that Mr. Ewing was appreciated for his efforts, and for the work he had done in increasing the consumption of gas. He had not had any experience of serving a corporation, but knew what it was to be under a company; and though the directors might appreciate a manager's efforts, consumers as a rule did not, either in his reducing the price of gas or in his taking off meter-rents or fixing stoves. In fact, his experience had been that if a company felt themselves in a position to reduce the price of gas, say, 5d. per 1000 cubic feet, all the thanks they got in return was that the consumer would turn round and remark that the reduction ought to have been 10d. In his small way, he had done nothing in the matter of stoves, except in advising which would be the best stove or fire, or gas supply, to introduce, in seeing that the house was properly fitted up, in supervising the plumbing work, and in selling the article at net price to the consumer. He must endorse the statement made by one or two of his neighbours, with regard to sulphate of ammonia, that since Mr. Carlow had introduced sulphate plant in Arbroath, they had not found that they could get more for their tar and liquor than they obtained previously. They sold their liquor at so much per ton of coal carbonized, which, he thought, was the simplest way. As regarded Sunday labour, many years ago he read a paper before the North British Association on the subject of the cessation of Sunday work, which he advocated. But in those days they worked twelve-hour shifts; and he now thought that if stokers worked eight-hour shifts the stopping of work on Sunday was quite unnecessary. At the same time, when he used to stop the works for twelve hours—from six on Sunday morning till six at night, he did not find that the retorts or the heats suffered in the slightest. Of course, if they found they could miss a charge during the week, they would never think of working right through on Sunday, and lying off on Monday. They made a calculation to see how much spare holder room they would have on Monday, and if they found that they could save a run, they always did it on Sunday.

Mr. W. B. M'LUSKY (Selkirk) pointed out that at Galashiels there had been no stoking on Sundays for thirty-five years, and it had been a very prosperous undertaking. It would appear, therefore, that the cessation of labour on Sundays was perfectly practicable. For his own part, since he had had the management of gas-works, he had never charged on a Sunday at all, and he got fairly good results. His method was to fill the retorts at four o'clock on Sunday morning, and start charging again at six o'clock at night. They never had any smoke at the chimney-head. Of course, the settings were regenerative, and he had complete control over the primary and the secondary air, which had a good deal to do with the success of the system. Mr. Ewing disposed of his liquor at 4° Twaddel, for 2s. 6d. per 100 gallons. He considered it was a mistake to allow liquor to leave the works at this strength, as they were simply sending away an agent which was valuable for purifying the gas and improving the strength of the liquor, on account of its properties for the absorption of carbonic acid and other impurities. He preferred to sell liquor at 8° Twaddel; and in this way he got a better price for it. In Selkirk, he could not sell over 5°; but they were taking steps to provide a machine by which to properly concentrate the liquor before letting it go to the distiller. With regard to the suggestion that there was a "ring" in Scotland to keep down the price of liquor, he might say that when he found he could not get a suitable price in Scotland, he sent it to the North of England. Of course, his position was between the North of England and the West of Scotland—about seventy miles from each; and he thought it would pay anyone in the West of Scotland, who was only getting 2s. 6d. per 100 gallons, to send liquor to the North of England, especially if it were concentrated to 8° Twaddel.

Mr. J. NAPIER MYERS (Saltcoats) said he also had listened to the address with some degree of envy. The matter he was most interested to hear about was the prepayment meter. The desirability of booming that apparatus had been spoken of. This had not been his attitude at all. He had looked upon the meter not altogether with satisfaction. He had endeavoured to give it a bad character, as he had only supplied it to bad payers. When he put in a slot meter, it was evidence of the difficulty of obtaining payment of some account. In Saltcoats they had gas in every house. They often had not very large accounts, because, being a coast town, they had 300 or 400 houses shut up in the winter time. In the winter, he had had no accounts in for as many as 400 out of 1800 meters. It had been remarked to him that those letting houses were desirable for prepayment

meters; but he had at times experienced difficulty in putting these meters into such houses. When they went wrong, some trouble was entailed in finding out who had damaged them. It had been his experience that the roasting part of stoves was employed perhaps only once for every twenty times that the top plate was used; and his attitude upon this subject had been that while it was incumbent upon them to educate their consumers in the use of gas for other purposes than lighting, they were not called upon to go very largely into the gas-cooking business. Still they had already done something. They had let out grillers. They fixed them, and they charged the very modest rent of 1d. a month—1s. per annum. His experience was that a very serviceable griller could be supplied and fixed at a charge of 10s. From this very small apparatus he was able to get a good return. In his town, the houses were mostly small; and the larger ones were not often used for letting purposes. He had thought it his duty to advise his Directors not to go into stove-hiring, as it was no part of their business to deal in ironmongery. It had been their practice, during the past five or six years, and perhaps longer, not to work on Sundays; but labour did not wholly cease. They charged the retorts in the morning, till breakfast time; and from then until nightfall it had been their practice not to make any gas. He held that gas-works which could not lie off at least from eight to twelve hours on a Sunday, were not equal to their work, satisfactorily, during the rest of the week.

Mr. D. Vass (Edinburgh) said that in his district (Portobello) there were many letting houses. They began some years ago, when the undertaking belonged to a Company, supplying prepayment meters; and they had applications for them chiefly for these houses. The reason for this was that they held the yearly tenant of the house responsible for all the gas consumed, even though there might have been half-a-dozen tenants—some of them staying a fortnight, others a month, and so on. He read the meter, but held the householder responsible for the gas consumed. Sometimes, in this way, the householder was left with the bill to pay; for occasionally a person would go away without paying the rent or the gas bill. Prepayment meters were tried as an experiment. They had, of course, the difficulty to contend with that when a meter went wrong they did not know who to blame for it; but they held to their rule that the yearly tenant was responsible. Doing so, they had never had any difficulty in recovering. There was another difficulty, in that one person might know how to work a prepayment meter, but another might not; and thus they might have to go to a house half-a-dozen times in the summer. Still, he thought it was very desirable to have prepayment meters in houses which were let in summer. It was more, perhaps, a consumers' than a gas managers' question; but the body supplying the gas were interested in serving their consumers in the best way they could. Of course, they charged an extra price for the gas, to cover the additional expense—say, about 1s. per 1000 cubic feet.

Mr. J. B. Terrace (Brechin) said he sympathized with Mr. Ewing in his remarks about electric light coming into all their towns by-and-bye. His town and Montrose were to be the foremost of the small places to be tried with it. He did not take a very despondent view of the matter. On the contrary, he did not think that they would be much harmed by it—for some time to come, at any rate. There could be no doubt that when coal rose to them from 34 per cent. upwards, it would do the same to manufacturers of electricity. He had heard that, in some small places, shopkeepers used electric light only on Friday and Saturday nights; but that the arrangement was found to be unsatisfactory, and they soon got tired of it. Goods did not look the same in the different lights. He did not think that the higher price of coal was likely to lead to the raising of the price of gas; they would have to make up for the extra charge in some other way. He tried prepayment meters, in a small way, with great success. He always endeavoured to encourage those who burned oil to take them; but if people who had an ordinary meter wanted a prepayment one, he tried to reason with them, and to show them how much cheaper it was to have an ordinary meter. They both sold gas-cookers at cost price and hired them; and they had done very well. In regard to sulphate of ammonia, his works were, like those of some of his friends, not situated in a good place for its manufacture; being surrounded by houses.

Mr. R. B. Main (Glasgow) wished to say a word about the lighting of railway stations, to which the Chairman had referred. One of the most interesting installations of gas lighting in recent times was, he thought, that of the Great Central Railway Station in London. He went to see it about ten days ago; and it was very interesting. Not only the platforms, but all the waiting-rooms and booking-offices, were lighted by gas; and the total cost for one hour's lighting of the whole had been ascertained to be only 2s. 6d. The lighting was by incandescent burners; and there was a special pressure of 9 inches, produced by means of a simple jet of water.

Mr. Forbes Waddell said that a partner in one of the largest factories in Forfar, in which electric light was used, told him that in addition to the electricity costing them a good deal more than gas, they had to incur an expenditure of £300 a year to heat up the factory to the temperature required for the working of the material. This was unnecessary when the factory was lighted by gas.

Mr. J. M'Gilchrist (Dumbarton) thought it very creditable of Mr. Ewing to come forward and give them all the results of his own experience, so that they could discuss them. It was not every gas manager who could do this, and it was not every gas manager who could put such good material before them. Mr. Ewing talked of thousands of increase in a year as if they were penny-in-the-slot meters. He had obtained quite £6000 a year clear gain, on the basis he had laid down, which entitled him to rank as one of the first engineers of the day. With regard to the fitting up of gas-stoves, he thought they were departing altogether from their business of gas manufacturers when they took up the position which had always hitherto been occupied by the landlord of the property. He understood that if they put a gas-pipe into a house, it became the property of the landlord. He thought that the farthest they should go in this direction was simply to hire out. But, in the next place, there was not such a great profit to be derived from stoves. He rather thought, with Mr. Myers, that the working-class population particularly would derive much greater benefit from the use of grillers. Mr. Ewing had spoken of the people south of the Border being able to teach them a lesson in this matter; but they knew that the workpeople in "puir auld Scotland" had roasts much more seldom than they had in the south. Again, he thought that the prepayment meter had not been the great success in Scotland that it had been in England. Speaking of the towns he knew, single-apartment houses in Scotland were fitted up for gas lighting; whereas there were villas in England in which there never was a gas supply until penny-in-the-slot meters were introduced. In Scotland, therefore, there was not the same ground to cover. The question of working up sulphate was discussed at last year's meeting; and he thought there had been no change since then. Mr. Ewing's recommendation to work up tar products was, he thought, altogether in the wrong direction. He held that they should be gas manufacturers, and not sulphate of ammonia manufacturers or tar distillers. A man, in the smallest gas-works, had plenty to do if he paid attention to the economical production of gas, and the pushing of the sale of it. His reason for saying this was that in the great corporations in Scotland where there was a tar-works, these were found to be a great loss, even where they were in a position to employ their own chemist to work them. In Glasgow, they were very keen business men. They had tar and liquor works there; but they found it cheaper to let them to a tar distiller. The man who had been brought up to the business knew best how to handle the works. Mr. Carlow was not quite so proud of the position he took up last year. He said he did not regret having put up sulphate plant; but perhaps if Mr. Carlow had to do it again, he might not.

Mr. Carlow: I would do it to-morrow.

Mr. M'Gilchrist did not know how the gentlemen from the north took up the position that the adoption of sulphate manufacture in Arbroath should raise their prices. He rather thought they had been too severe on this point. With regard to oil, it was the case that its adoption had reduced the price of coal. Perhaps sulphate was in the same position. He hoped all those who had oil plants would continue to work them, because he thought that if they did so, they might secure cheaper coal. He did not know where they were to find men to occupy the position of gas managers if they were to tack on to their duties not only the business of wholesale ironmongers and gas-fitters, but also that of tar and liquor distillers. He did not know why it was that electric light manufacturers had rushed away to the north, when they had much better fields in the south. Did the managers in those towns not think that if they reduced the price of gas for lighting, instead of for cooking, they would better keep out the electric light? If the electricians were to come to Dumbarton, he would be quite glad that they should take up the lighting of the streets, which was what they were best at, and which, he thought, was no source of profit to the gas maker.

Mr. A. Yuill (Alloa) had no doubt that Mr. Ewing's results would act as an incentive to them to do all they possibly could in their own works. He himself had had experience both of selling tar and liquor, and of manufacturing sulphate of ammonia and distilling tar; and he could candidly say that it was a source of profit to manufacture sulphate of ammonia. He would almost give it, at the lowest estimate, at 1d. per 1000 cubic feet of gas. If they took Mr. Carlow's figures for last year, they would find that the profit was $1\frac{6}{16}$d. per 1000 cubic feet. He could see quite well how it came about that Mr. Waddell received only 1s. 7d. for his tar and liquor, though the price of sulphate had risen to £9 10s. per ton. The price of naphthas and benzols to a large extent determined the price of tar; and tar was a considerable factor with distillers in the figure they gave for tar and liquor, when sold combined. He did not think there could be any doubt at all but that if any manager wished to increase his profits, stoves and other gas appliances would materially aid him. His experience for years, in leaving this matter alone, as Mr. Myers did, was that gas-fitters and ironmongers did nothing too. When the Commissioners took the matter up, the public had confidence in them, and they also took to it. His Commissioners had made application for a Provisional Order for the supply of electric light. They were contemplating putting the plant in the gas-works, so as to have the management of the two illuminants under one control. He had gone into some figures, to show the difference in cost between electric light and gas—more especially incandescent gas lighting. Suppose they took ten electric lamps of 16-candle power, these would give a light

of 160 candles, and would require 600 watts of current, which, at 6d. per unit, would be equal to 3·6d. per hour for the ten lamps. Taking the newer forms of incandescent gas-burners, and assuming that they obtained 20 candles from 1 cubic foot of gas, a light of 160 candles would require 8 cubic feet of gas per hour, which was equal to 0·24d., or a little under a farthing, to give the same light. The question of electric motors for small powers had been brought before them. He had also made a calculation as to them. With gas, they could develop from 20 cubic feet 1-horse power per hour. For ten hours this would equal 200 cubic feet of gas—equal to 6d.—as the cost of a 10-horse power gas-engine for one hour. An electric motor would require 760 watts for 1-horse power per hour, or 7600 watts for ten hours, which, at 6d. per unit, would equal 3s. 9d. per hour. Taken altogether, he thought they had no reason to fear the incoming of electricity.

The CHAIRMAN, in closing the discussion, thanked them all sincerely for their remarks, and reviewed, in a judicial manner, the observations which had been made.

Mr. POOLEY proposed a vote of thanks to Mr. Ewing for presiding at a meeting which, he said, had been so enjoyable.

On the motion of Mr. M'GILCHRIST, Mr. Yuill was re-appointed Convener of the meeting.

Mr. YUILL proposed that Mr. J. W. Carmichael, of Barrhead, be Chairman at next year's meeting, which was agreed to.

The customary dinner was afterwards held in the same hotel—Mr. Ewing in the chair.

MICHIGAN (U.S.A.) GAS ASSOCIATION.

Annual Meeting at Lansing.

This meeting was held on Feb. 22, when the President, Mr. C. H. RAYNOR, of Adrian, Mich., occupied the chair.

The President, in the course of his Inaugural Address, spoke hopefully with regard to the future of the gas industry, and instanced the progress being made in the introduction of incandescent burners, reduced prices of gas, increased output (especially for fuel purposes), and increase in the number of consumers. The tar market, however, continued weak, and showed but little prospect of improvement. An increased output was reported by 23 out of the 24 gas companies in Michigan; the total amounting to over 100 million cubic feet. The corresponding figure for 1897 was 70 million cubic feet. Of the total sales, about 60 per cent. was for lighting purposes, sold at an average price of 6s. per 1000 cubic feet.; and 40 per cent. for fuel, at an average price of 4s. 10d. Many were now sending out over 50 per cent. for fuel; and one company had reached 67 per cent. Referring to the gasholder accident at New York, he deprecated the too general custom of accepting contractors' prices from the standpoint of cheapness only. A favourable mention was made of the labours undertaken by the American Association in the matter of technical education. Great advancement was being made in the engineering world generally; and gasmen should do all in their power to keep up to the standard.

Mr. John R. Lynn, of Benton Harbour (Mich.), read a paper on the "Importance of Proper Boiler-Settings in Connection with Water-Gas Plant." In the first place, he insisted on the necessity for duplicate boiler power, and recounted his experiences with a single boiler that developed a defect early in October, necessitating the fixing of a second one within four days, during which the injured boiler was worked at considerable risk. Examination showed that the defect—a blistered plate over the furnace—was due to the boiler having been set 4 inches low at the front, while the blow-off valve was at the back. It was found, in addition, that the working water-line was 6 inches too low; leaving the upper row of tubes exposed to a high heat. He also observed that, while the aggregate cross section of the flues was 286 square inches, that of the stack was only about half this figure. He therefore advised those who were putting up water-gas plants to see that the boilers were of sufficient capacity and number to enable one to be cut out for repair when necessary; to have them properly set, with gauges, blow-offs, &c., accurately connected, and flues of proper sections; and in practical working, to have careful and expert inspection at regular intervals, as secured by placing a boiler insurance policy with some good, reliable company. Attention was directed to the relative economy of fuels; and the results of some experiments on a 60-horse power horizontal boiler were given. The quantity of water evaporated per ton of fuel ranged from 12,588 lbs. to 17,270 lbs., and the cost (at market prices) from 0·8d. to 1·75d. per 1000 lbs. of water evaporated. The same boiler was fitted for natural gas; and with gas at 1s. 0½d. per 1000 cubic feet, the cost per 1000 lbs. of water evaporated was about 2d. One ton of bituminous coal as a heating agent under boilers was stated to be equivalent in value to 4500 lbs. of dry wood, 2500 lbs. of gas coke, 200 gallons of coal tar, 180 gallons of petroleum, or 25,000 cubic feet of natural gas; and manufactured gas was altogether out of the running. When using natural gas, ordinary burners proved preferable to a steam-jet arrangement.

A discussion followed the reading of the paper; the boiler insurance system being heartily supported. It was also stated that 1 gallon of water-gas tar was equivalent as fuel to 1 lb. of coal. The supply must be even, and the tar-pipe protected from radiated heat.

"A Desirable Increase and its Source" was the subject of a communication by Mr. S. E. Wolff, of Jackson (Mich.), who specially advocated any feasible plan for increasing the rate of consumption of gas per consumer. He had given considerable attention to the establishing of a gas-fittings department, partly for encouraging the use of gas cooking-stoves, with this object, and also with a view of inducing customers who used gas for cooking only to adopt it for other purposes also. Care was taken to do the thing well, by employing competent and reliable workmen; and the results showed that it was possible to increase the consumption per consumer to the extent of about 50 per cent. Selecting twenty customers at random, he found their annual consumption had been increased from an average of 2040 to 3210 cubic feet; and this additional gas was supplied at a very slight increase over the cost of manufacture.

Mr. B. O. Tippy, of Grand Rapids (Mich.), contributed a paper entitled "Pitch in Hydraulic Mains." Consequent on raising the working heats of the retorts, so as to be able to increase the weight of the charges, and also the yield per ton, he was troubled by the rapid formation of pitch in the hydraulic. With six beds in operation, the continual services of three or four men were required to remove the pitch. At the same time, the ascension-pipes gave great trouble by continually choking. The settings were full-depth regenerator, double settings, with six through retorts, 21 feet long, having mouthpieces and independent hydraulics at each end. The ascension-pipes were 8-inch, the hydraulics were 3 feet clear above the brickwork, and there was 2 feet of brickwork above the arch. The tar was drawn off at intervals by a cock and 3-inch pipe at the bottom of each main; the seal being made up with water after each draw-off. The hydraulics were well protected from heat. In fact, the temperature of the pitch at the bottom of the main was only 140° Fahr., and lower than that of the water above it. He tried sealing one hydraulic heavily, so as to force all the gas through the other; but the experiment had to be abandoned on account of the rapid choking of the ascension-pipes. Some tests in the way of partitioning off the retorts at the middle—thus dividing each one into two independent retorts—gave such hopeful results that the whole were so treated; and after several months' operation, he could say that the plan was a remedy for the trouble, as he was practically free from the annoyance of chokes or pitch, while maintaining the same heats as before. The results of a number of experiments were quoted, which showed that with the 21-foot retort, one end sealed, the temperature of the gas, taken at a point 8½ feet above the mouthpiece, was 700° to 800° Fahr. during the maximum production of gas. With the 10-foot retort it was about 450°. The analyses of samples of the gas showed a marked reduction in the percentage of illuminants with the 21-foot retort. The tar was also much thicker, and, in fact, degenerated almost into solid soot towards the ends of the charge; but with the 10-foot retort there was no lampblack, and the analyses showed that the solid carbon was due to the decomposition of hydrocarbons.

A paper on "The Use of Gas for Purposes other than Fuel" was read by Mr. H. W. Douglas, of Ann Arbor (Mich.), who considered that while a great deal had been written and said about selling gas-stoves, gas for fuel, &c., the illuminating side of the business had been neglected; and he quoted figures to show that the increase in this department was only about 13 per cent. over the last ten years. As to competitors, kerosene could be met by the prepayment meter. Electricity possessed certain advantages, which could be encountered to a great extent by care and attention to the subject of lighting, the latest and most improved methods of gas lighting, &c. In shop-window lighting, it was a great advantage if the lights themselves could be concealed by suitably arranged reflectors. An excellent effect was produced by fixing a row of incandescent gas lights about 2 feet apart, as near the ceiling as possible, with reflectors to throw the light down. A good electric igniting arrangement was now on the market. Care should also be taken that the window is properly ventilated. As regards ordinary indoor lighting, the public needed a lot of education; the general defect being that the gas lights were placed too high. He thought that fuel gas had been advertised and pushed quite enough, and that it was time for illuminating gas to have a turn.

Mr. A. L. Zwisler, of Coldwater (Mich.), read a paper on obtaining new consumers. He advertised by systematic canvassing, combined with a liberal policy, which included buying second-hand oil-stoves at a high price when they were replaced by gas-stoves. The employees of his Company were encouraged to take out the gas account in goods from shopkeepers. Each new gas-stove fixed was advertised in the daily paper.

The routine business was then conducted in the smart manner peculiar to this Association; the officers for the ensuing year being elected *en bloc*, and the votes of thanks disposed of with similar expedition. The meeting was then closed.

A Steel Water-Pipe Line.—The steel pipe-line for the Indianapolis Water-Works is made of ¼-inch plates in courses 6 feet long; there being two plates to each course. A peculiar feature of the construction is that angle-iron stiffening-rings are riveted outside the pipe at intervals of 10 feet. The pipe-line takes the place of an old wooden flume from the upper canal, and furnishes power to the pumping-station and to several mills; the turbines at the station being under a head of 50 feet.

THE UTILIZATION OF BREEZE.

Herr E. Froitzheim, of Cologne, has contributed to a recent number of the "Journal für Gasbeleuchtung" a suggestive article on the disposal of coke breeze, of which we give the substance below.

Coke as produced in gas-works is picked up by forks, which screen from it dust and pieces not exceeding about 1·2 inches in diameter. The coke thus picked up is the ordinary kind which is sold as fuel; and the screenings form small coke or breeze, which may be burnt by the aid of a powerful draught. Coke, however, is frequently broken by a machine, and screened from dust, when it is known as "broken coke," and consists of lumps from 0·25 inch to 1·6 inches in size. The screenings from the broken coke frequently amount to as much as 20 per cent. of the whole, and generally contain a large quantity of ash. They cannot be burnt on an ordinary grate, nor in a gas-producer. Many attempts have been made to find means for utilizing this breeze as fuel. There is a continually increasing demand for broken coke for use as household fuel; and it secures a higher price than any other description of coke.

In 1894 an attempt was made at the Cologne Gas-Works to form breeze into briquettes by means of waste pulp from cellulose works. The pulp cost only 8d. per ton of briquettes produced; but the experiment was a failure for several reasons. Very prolonged drying in the open air was essential in order to obtain briquettes fit for transport. Even thoroughly dried briquettes crumbled in the fire; and a great deal of the breeze fell unconsumed through the grate. The briquettes burnt so sluggishly that a fire, even if started with other fuel, could not be maintained by them alone. In order to overcome this fault, it has been suggested that nitrate of soda should be added to the binding material. This suggestion, however, was not tried at Cologne. The only method of consuming breeze which so far has proved successful is by means of an air blast on a suitable hearth. Two arrangements for consuming breeze—the Kudlicz grate and the Perret furnace—have been tolerably extensively used in Germany for some time past. Another device—the Wiedenbrück and Wilms furnace—has lately been used at the Cologne Gas-Works.

The fire-bars are hollow castings, so formed that an air passage traverses their whole length twice. Each bar is made in two halves, which are afterwards riveted together with an insertion of asbestos packing to ensure tightness. The air enters a chamber at one end of the bar, and traverses first the upper and then the lower air passage. The end of the lower passage is closed; but there are a number of lateral perforations inclined upwards, through which the air escapes to the fuel on the bars. As many bars as are necessary are placed side by side, and connected to one air chamber; and if the furnace is a large one, the air chamber is placed across the middle, in order to supply two sets of fire-bars—one extending to the front, and the other to the back of the furnace. The bars may be about 3 feet long; so that a grate with a double set of bars may be 6 feet in depth. The air chamber is connected with the pipe leading from the fan or other appliance for supplying air under pressure. The air supplied is distributed uniformly over the grate; and therefore the furnace depends less than others for its proper working on the care and skill of the attendant. The air, moreover, enters the bars in a cold state, and cools them; but at the same time it is warmed by them, and issues from the orifices at a high temperature—thereby benefiting the process of combustion. Being kept cool by the air passing through them, the bars do not wear away rapidly.

After preliminary trials, four of these breeze furnaces were introduced in a new boiler installation at the Cologne Gas-Works. A preliminary test, in which a fan driven by an electric motor had been used to furnish the blast, showed that a blast of dry air caused the breeze to burn at a very high temperature, and thus form impervious cakes of clinker, which soon interrupted the flow of air, and reduced the efficiency of the furnace. The bars, however, remained cool. A jet of steam was then introduced into the blast-pipe; and it answered so well that it was decided to use a steam-jet blower instead of a fan in the final installation. The steam-jet blower, moreover, can be installed at a smaller initial outlay; but the working cost is relatively high, owing to the large quantity of steam it requires. The Cologne installation comprises four water-tube boilers on the Dürr system, each with 2158 square feet of heating surface. A clay pipe, 2 feet in diameter, serves to bring air from a distance of about 55 yards. This pipe enters a tunnel which runs beneath the boilers, and the air is forced by steam-jets into the air chambers of the grates. The noise of the jets is thus excluded from the boiler-house itself. The installation has worked uninterruptedly for a year. The fire-bars, after 4000 hours use, do not exhibit any signs of wear. Only the most inferior breeze has been burnt, and no better fuel has been added to it.

The following are the details of a trial which compares favourably with trials of a Perret furnace at Cologne, and of a Kudlicz grate at Nuremberg. (Particulars of the trial of the latter were published in the "Journal" for Jan. 11 last year, p. 78.) The Dürr boiler used had a heating surface of 2158 square feet, and a grate area of 43¼ square feet. The trial extended over 24 hours. The consumption of breeze was 16½ lbs. per hour per square foot of grate area. The refuse amounted to 28·62 per cent. of the weight of fuel. The feed water was at a temperature of 165° Fahr.; and 1·86 lbs. were evaporated per hour per square foot of heating surface. One pound of breeze evaporated 5·4 lbs. of water. The pressure of the air blast was about 28-10ths; and the draught over the hearth showed a pull of about 6-10ths. The temperature of the chimney gases was 379° Fahr. They contained 5·25 per cent. of carbonic acid, and 15 per cent. of oxygen. The breeze used contained 20·34 per cent. of ash, and 10·96 per cent. of moisture. The steam-jet required about 10 per cent. of the steam produced; and consequently about 4·5 lbs. of steam remained available for use per pound of breeze consumed.

As the need for power on gas-works is daily increasing, owing to the spread of mechanical appliances, boiler installations become more and more important features of the works. Hence the use of breeze as boiler fuel becomes of greater moment. It seems quite possible, by means of tubular boilers, to employ with good results very inferior breeze as the sole fuel for the boilers on gas-works.

PRACTICAL NOTES ON MAIN LAYING.

The following article on the above subject by Mr. Lester Price, of Evanston (Ill.), appeared in the "American Gaslight Journal" on the 20th ult.:—

A great deal of attention has been given in the last few years to the question: "Which is the best material for street mains—wrought or cast iron?" and to this day it remains a bone of contention. The cost of the pipe, the price at which it can be laid in the trench, the soil in which it is laid, the cost of keeping it in repair, and which material, if either, gives the least percentage of leakage, are all points that must be carefully considered. The extended use of wrought iron at the present time (I refer to pipes 6 inches and less in diameter) would seem to indicate that it is rapidly growing in favour. Certainly its ease and economy in laying, with its slightly lessened cost per foot as compared with cast iron, are features that commend themselves if the question of leakage and durability is satisfactorily determined.

Here in Evanston, in the last few years, where the North-Western Gaslight and Coke Company have been compelled, owing to the extensive street paving, to renew or relay a great deal of their mains, I have found wrought-iron pipe, which had been buried for years in a section of the city where the soil is of a sandy nature, in a well-preserved state, and in just as good a condition as the cast-iron pipe laid about the same time. In another portion, where the soil runs to a thick, heavy clay, the wrought-iron pipe was found badly corroded, while the cast-iron pipe was still in fair shape. More or less leakage was found in nearly all the joints of the cast-iron pipe; and in some cases, owing to expansion and contraction, the lead was drawn nearly half an inch. Less trouble, on the contrary, was experienced with the wrought-iron pipe; for where corrosion had not actually taken place, and due care had been used in placing expansion joints, a smaller percentage of leakage was encountered.

We make it a rule to lay our pipes below the frost line—the average depth being 4 feet; and where we have been able to use the wrought iron (and we never hesitate to do so where there is no clay), it has resulted in a saving of between 3 c. and 4 c. per lineal foot, as the following comparison will show:—

4-Inch Cast Iron.	Cost per Foot.	4-Inch Wrought Iron.	Cost per Foot.
Material	$0.163	Material	$0 150
Digging and filling . . .	0.070	Digging and filling . . .	0.068
Caulker and two helpers. .	0.025	Pipe layer and two helpers .	0.017
Lead, yarn, blocking, &c.. .	0.019	Red lead paint, blocking, &c.	0.007
Total	0.277	Total	0.242

We use no cement joints; but I think it has been established beyond doubt that a cement joint, if left undisturbed, is as nearly gas-tight as it is possible to make any joint. Yet, as pipe must expand and contract, and as the joint is rigid—so rigid, in fact, that there is absolutely no give to it—unless you place a lead joint of some kind every 200 or 300 feet there will be a great many breaks. I believe I should prefer to have the lead draw a little at each joint rather than have broken mains to contend with, especially in winter time, when they are hard to get at.

Distribution.—A great deal of judgment and foresight is required on the part of the gas engineer to determine just what size mains are adequate for the supply of any particular district. Besides estimating the immediate wants of the territory, he must make provision for the future. He must know what size to make his main feeder, and he must see that the subsidiary mains, or those which branch in every direction from the main feeder, are large enough to equalize the pressure; thus avoiding, as the territory grows up and consumers increase, any excessive initial pressure at the works.

Pipe Laying.—Care should be taken that mains are not laid close to, and parallel with, water or sewer pipes, and certainly never in the same ditch, as any settling of either would quickly destroy the grade of the gas-main if in close proximity. It is also important that the trench is straight, and that it is bottomed out somewhere near level. A workman who is compelled to lay his pipe up hill, down dale, and round corners, to accommodate the

twists and turns of a crooked ditch (as in fig. 1), simply cannot make a job that will hold, I care not how good a caulker or pipe layer he may be. If the run is not straight, or approximately so (as in fig. 2), the joints, having what is termed a "slack side," will sooner or later leak.

FIG. 1.

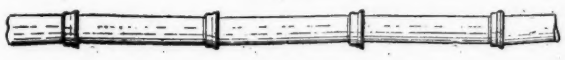

FIG. 2.

In laying pipe, close watching is necessary on the part of the workmen to see that the lengths are sound and in good condition. Cracks are not easily seen at the best of times, especially those newly made; and, unless great care is exercised, a defective pipe will be overlooked, and allowed to slip into the trench. Besides carefully inspecting each length, the practice should be followed, if it be cast iron, of striking it lightly with a hammer—a sound and perfect pipe giving a clear metallic ring. If a derrick is used, this hammer test is best made when the pipe is overhanging the trench, and swinging free from the tackle above. Every length should be thoroughly swabbed out and crowbars used after it is in the ditch and in position (but before levelling is done) to force it home, and to see that the spigot end butts firmly against the adjoining pipe.

With wrought-iron pipes, care must be taken when screwing the lengths together that they are not started or cross-threaded, and that the threads are clean and in good condition. If battered or otherwise damaged from rough handling, it will be nearly impossible to screw the pipe well up to the shoulder. As to paint, two or three coats of some good heavy material afford an excellent protection—preventing corrosion, and adding greatly to the life of the pipe.

Lead Joints.—In making lead joints, neglect and oversight are probably more likely to happen than in any other work. If the lead is cold, or there is not enough in the ladle to fill the joint at one pouring, and the kettle man is obliged to replenish, the joint, when complete, will be less homogeneous and perfect. A careless workman is apt to shirk the proper caulking on the under side of the pipe, where it is hard to reach, and where bad workmanship is not so readily observed; or perhaps he is obliged, by reason of a treacherous ditch, to be constantly on the alert, and thus compelled to hurry and slight the work. There is always danger, too, from improper yarning or a too persistent caulking. The workman must see that the yarn is not rammed beyond the spigot and into the adjoining pipe, and that sufficient is put in to cause the tool to spring back when impinged against it. Care must also be taken that the lead is not "drawn," by taking off the surplus with a cold chisel instead of the caulking-tool, and that the joint, after being sufficiently caulked, is not loosened and upset by continued hammering. There is a time to quit; and a good workman should know when that is. The quantity of lead required to make an average joint varies somewhat; but I prefer the following table:—

Size Pipe. In.	Depth. In.	Thickness. In.	Weight. Lbs.	Size Pipe. In.	Depth. In.	Thickness. In.	Weight. Lbs.
3	1½	⅜	3	12	1¾	7/16	13
4	1½	⅜	3½	16	2	7/16	17
6	1½	⅜	5	20	2¼	7/16	21
8	1¾	⅜	7	24	2¼	½	24
10	1¾	7/16	9	30	2½	½	30

Back Filling.—This is a matter often slighted; and frequently, in the hurry of getting in as many lengths of pipe per day as possible, the earth is thrown back in such a manner that the main is forced to one side, causing leakage. Besides a thorough blocking, rammers with bent ends should be used to pack the earth solidly and firmly around the pipe, so as to afford it adequate support without danger of sliding or settling. The practice of laying gas-mains without any blocks at all should be severely condemned. Crowding in a little dirt here and taking out a little there, in an attempt to hold the pipe in a permanent fixed position, is, in my opinion, a precarious way of laying mains, particularly in ground that is newly made. I think that every length of pipe, whether wrought or cast iron, should be firmly supported with wooden blocks in at least two places, and that this support should be at a point not far from the joint, as shown in fig. 3.

FIG. 3.

The size of the blocks should depend somewhat upon the nature of the soil; wet and soggy ground naturally requiring a heavier blocking than where the soil is firm and hard. Here in Evanston, where both conditions are encountered, the following sizes seem sufficient:—

Size of Pipe.	Size of Blocks. Length. In.	Breadth. In.	Thickness. In.
3, 4, and 6 inch	10	6	1
8, 10, and 12 inch	16	10	1½
16, 20, and 24 inch	20	12	2

Testing.—Never permit a foot of pipe to be covered up until every joint has been tested. The use of soapsuds is better than a light, being less dangerous, and a more positive detector of small leaks. Regular and systematic tests should also be made after completing the run, by means of a meter (fig. 4), first seeing

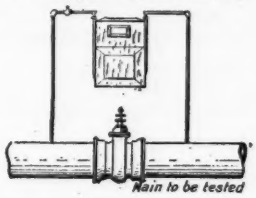

FIG. 4.

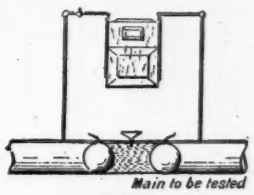

FIG. 5.

that all services or other openings on the new line of main are closed. If found impracticable to section off with valves, two rubber bags with a water-seal between them (fig. 5) will answer the purpose.

A great many gas companies, instead of using a meter for testing, employ a portable gasholder (fig. 6), which enables the

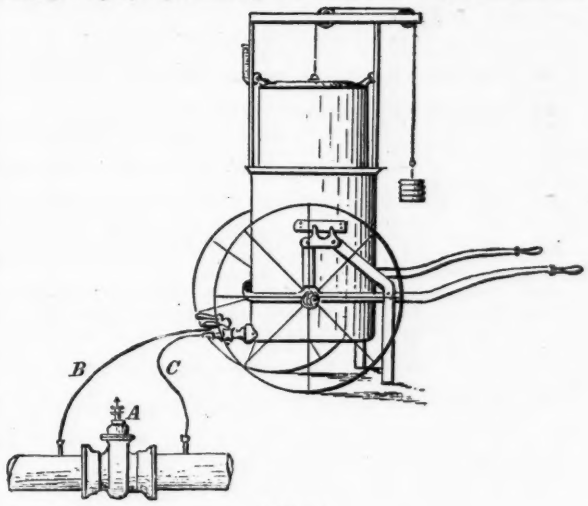

FIG. 6.

test to be made under a higher pressure than that already existing in the mains. It operates as follows: After closing the valve A, the gasholder commences to fill itself under the ordinary street pressure through the tube B. As soon as the top is reached, the supply-cock is closed, and the bell weighted to give it higher pressure. The cock in tube C is then opened, and the gas thus forced into the section to be tested. At first the movement of the bell will be quite rapid, or until the gas in the new main has been compressed. It will then remain stationary if the section is tight, or continue to descend at a more regular pace if there is a leakage; the gauge and scale in the side, graduated into cubic feet, indicating the extent of loss.

In addition to the foregoing methods of determining leakage, another way sometimes resorted to is to fill the section under test with compressed air instead of gas—an air-pump being used for the purpose. This method, however, while permitting a test to be made under excessively high pressure, involves more labour and expense, and is therefore not commonly practised.

Office Records.—Every gas company should have on file, either in the form of a memoranda or drawings, a full and accurate record of the street mains. It should show the location of every foot of pipe, and of every drip, valve, and service. It should indicate the size, whether wrought or cast iron is used, the depth of main, the direction of the grade, and where the summits are. For this purpose a small pocket-book (4 in. by 6 in. in size), commonly called a "field-book," should be carried by the engineer or foreman, one page of which is used for a sketch of the block, and the opposite for memoranda or an enlarged drawing of an intersection. From this field-book, which is more or less in the rough, the work should be transferred neatly to the office chart, which is a large, complete, and correct map of the distributing systems. Fittings, valves, drips, &c., can be shown on this map by appropriate symbols; while the size and kind of mains are best shown in colours.

In conclusion, I would say there is no part of the business too trivial for the personal attention of the manager or superintendent, whether it be laying mains, repairing leaks, or putting in services. Workmen unfortunately cannot always be depended upon in the absence of an overseer; and if any mistake is made, they usually have it covered up before he arrives—thus hiding for days, and possibly years, a blunder that is a constant drain on the profits of the company. It is not expected, of course, that he will be able to see everything; but if due caution is exercised in employing men, and care is taken that they are thoroughly accustomed to the work required of them, a great deal of worry and annoyance will be saved him, and the earnings of the company be much enhanced.

REGISTER OF PATENTS.

APPLICATIONS FOR LETTERS PATENT.

5965.—Southall, J., "Internal combustion engines." March 20.
5967.—Simmance, J. F., "Coin-freed fluid meters." March 20.
5971.—Wailes, G. H., "Compressing or exhausting gases." March 20.
6029.—Beau, H. R., and Ringwood, H. R., "Generation of acetylene gas." March 20.
6033.—Gill, R. W. R., "Acetylene gas-generator." March 20.
6051.—Kent, H. A., "Gas lamps or burners." March 20.
6056.—Tobler, A., "Pressure regulator and stop valve for gas supply." March 20.
6062.—Lehmann, K., "Incandescence lamps." March 20.
6087.—Philbrow, W. E., "Internal combustion engines." March 21.
6090.—Wright, J. F. & G. E., and Sutherland, A. G., "Coin-freed gas-meters." March 21.
6092.—Drake, J. A., "Generator or regenerator furnaces and producers." March 21.
6116.—Dolan, E. J., "Acetylene gas-burners." March 21.
6153.—Burrell, L., "Water-meters." March 21.
6165.—Appleby, E., "Automatically generating and storing acetylene." March 21.
6214.—White, H. C., "Generating acetylene gas." March 22.
6218.—Connors, M. F. & G. A., "Lighting by means of gas, vapours, or the like." March 22.
6223.—Day, J., "Internal combustion engines." March 22.
6225.—Kirkham, Hulett, and Chandler, Ltd., "Condensers for use in the manufacture of gas." A communication from F. Marshall. March 22.
6232.—Lange, C., "Carburetters." March 22.
6274.—Sunderland, R. H. & F., and Marshall, G., "Acetylene gas-generators." March 23.
6307.—Harcourt, A., and Rowland, M. H., "Internal combustion motors." March 23.
6328.—Robinson, J. W., and Hadley, H., "Apparatus for generating acetylene gas." March 23.
6333.—Glitsch, W., "Lighting and heating apparatus." March 23.
6342.—Justice, P. M., "Explosion engines." A communication from The Pope Manufacturing Company. March 23.
6390.—Woodroffe, J. H., "Generation of acetylene gas." March 24.
6440.—Barcroft, H., "Internal combustion engines." March 24.
6473.—Bollé, C., "Igniting gas-burners from a distance." A communication from C. Fitzlaff. March 25.
6509.—Collins, T. J. R., "Locking gas and other supply taps." March 25.
6525.—Wanderpepen, G., and Van Berckelaer, A., "Manufacture of gas." March 27.
6584.—Horst, E. C., "Interchangeable coal and gas grate." March 27.
6585.—Boudeville, A., "Gas and oil engines." March 27.
6602.—Hedgeland, F. W., "Acetylene-lamps." March 27.
6603.—Secor, J. A., "Explosion engines." March 27.
6610.—Von, H. P. de, "Gasifying mineral oils." March 27.
6632.—Froggatt, E., "Gas-burners." March 28.
6666-7.—Becker, A., and Pfau, R., "Gas apparatus for heating water for baths." March 28.
6709.—Williams, A., "Gas-lighters." A communication from L. Daft. March 28.
6743.—Clay, W. R., "Improved means of lamplighting." March 29.
6781.—Bauer, K. & M., "Gas or oil engines." March 29.
6796.—Littlejohn, J., and Laing, W. R., "Gas or oil engines." March 29.
6832.—Codd, T. J., "Non-return valves for steam, water, gas, and other fittings." March 29.
6839-40-41.—Naef, P., "Producing coke, gas, and bye-products." March 29.
6865.—Gardner, T. H., E., & L., "Ignition devices for internal combustion engines." March 30.
6911.—Jensen, C. A., "Igniting devices." A communication from R. Jungas. March 30.
6914.—Justice, P. M., "Explosion engines." A communication from the Pope Manufacturing Company (Incorporated). March 30.
6918.—Bachner, A., "Lighting gas and the like." March 30.
6919.—Duncan, J. H. H., The New Incandescent Gas (Sunlight Patent) Company, Ltd., and Barnett, H. T., "Incandescence bodies for gas lighting." March 30.
6925.—Combier, A., "Acetylene-generators." March 30.
6933.—Berger, F., "Acetylene-generators." March 30.
6936.—Kent, W. G., "Liquid meters." March 30.
6973.—Lèry, J. B. de, "Incandescence gas-burners." April 1.
6998.—Smith, J. L., "Gas and other stoves." April 1.
7007.—Ayton, R. C. "Internal combustion engines." April 1.
7009.—Senking, A., "Gas cooking-stoves." April 1.
7010.—Schubert, W., "Acetylene-gas generators." April 1.
7012.—Dent, F., "Purification of acetylene." April 1.
7019.—Lepape, H., "Carburetter for gas and other motors." April 1.

Cinderford's Darkness.—Cinderford, a town of 12,000 inhabitants, and the centre of a coal-field whose annual yield exceeds a million tons, is without a lighting system of any kind. Some years ago an effort to put an end to the disgrace through the medium of the Lighting and Watching Act failed, because of the difficulty of fixing upon a suitable lighting area. The matter has now been taken up by the Parish Council, who proposed to apply for £120 for the first year, which meant a rate of 2d. in the pound. At a meeting of the parochial electors, this scheme was carried by 115 to 7; but a poll was demanded on the ground that the area of the Cinderford Ward, which included the collieries, the railway, and the gas-works, was too large, and that the collieries were in too bad a way to stand this additional burden. It meant very nearly driving their only remaining industry away. The poll was taken. Of 1200 persons entitled, 768 voted, 459 for and 309 against; and as the promoters were 60 short of the required two-thirds majority, the scheme has again fallen through.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Lea Bridge Gas Bill.

Sir,—Although there were some features peculiar to this Bill, the decision of the Lords' Committee to reduce the Company's initial price is a matter of such interest and importance both to the public and to all gas companies, that it is to be regretted that the question was not more strenuously fought out, or the Bill withdrawn. But the promoters were obviously taken by surprise; and the Chairman, who took a strong line, made assumptions as regards the working of the sliding-scale which, not having been anticipated, were imperfectly met, though they could have been answered and refuted.

This hostility felt by Lord Camperdown to the principle of the sliding-scale is not a thing of yesterday, and I venture to think it might have been expected. In 1876 (July 27), when the Chartered and South Metropolitan Companies' Bills were in the House of Lords,* in a Committee of the Whole House, Lord Camperdown wished to deprive the Companies, in case of a purchase by a public authority, of any increased value the sliding-scale dividends might give, by inserting a clause to this effect—"that, for the purpose of estimating the value of the capital of the Company in the event of a purchase by any public or local authority, the stock or share capital, notwithstanding anything in this Act contained," shall be estimated "as entitled to a dividend of 10 per cent." The noble Lord complained of the Board of Trade and the Metropolitan Board of Works having supported the Bills, and he moved his clause in a speech which ignored the evidence taken by Mr. Foster's Committee the year before. Fortunately for the sliding-scale, he was fully answered by Lords Salisbury, Cairns, and Carlingford, who showed that, in accepting the sliding-scale with auction clauses, shareholders gave up the guarantee of 10 per cent., secured by the revision clauses, and, what was yet more valuable, the right to receive, under the Companies Clauses Act, all new capital at par; that there was a strong motive operating on companies to be economical of capital; and that the public would, by such economy, gain more than they could possibly lose by increase of dividends. Lastly, Lord Salisbury pointed out that any increase of capital value, the result of higher dividends, in the event of a purchase by a public authority, would be more than compensated for by the amount, in a few years, of the savings made by the consumers in the lowered price of their gas, the cheapening of which was a condition precedent to every increase of dividend.

Unfortunately, these considerations were not again pointed out to Lord Camperdown, who, in fact, appears to have forgotten them, when he spoke of "the large and substantial benefits" given by the Bill to existing shareholders. It should have been more strongly urged that the price *charged* rather than the *initial* price is the important thing for the consumer to consider, to whom the value of a penny reduction is worth several times that of the quarter per cent. of increased dividend; for a reduction of initial price, unless below the price charged at the time, does not benefit the consumer. The presence of a large premium capital might have been alluded to as enabling the Company to sell cheaper gas, rather than as increasing the security of the shareholders.

The different aspects of sliding-scale regulations are not at first sight apparent to everyone; and although 24 years have elapsed since their adoption, the probability is that many M.P's. at the beginning of a session are not familiar with them. Promoters therefore should, as regards the incidence of these regulations, take nothing for granted. They cannot too often repeat, and urge, that, in effect, the sliding-scale, with auction clauses, makes the consumers and shareholders partners in the advantages of a lowering of the price of gas. The respective proportions of such advantages depend (apart from the amount of capital per ton of coal carbonized) upon the premiums received by the sale of stock. The larger the amount of such premium, the greater will be the proportion of advantage to the consumer every time the price of gas is reduced; for the value of the $\frac{1}{4}$ per cent. additional dividend depends on the nominal amount of capital raised (provided par be obtained), while the value of 1d. per 1000 cubic feet depends on the quantity of gas sold, to make which premium capital is, of course, as good as dividend-bearing capital. It is the interest both of companies and consumers to get as large a premium as possible on a sale of stock, so as to keep down the dividend portion of the capital, and augment the other portion; but a reduction of initial price has exactly the opposite effect. Under these regulations, shareholders have no more interest in raising fresh capital than consumers; for the premium capital is applicable to the general purposes of the company, while the contingent advantages arising therefrom are shared, as above stated. It is a mistake, therefore, to say: "It is immaterial whether you put up a stock with an initial price of 5s. or 1s. 3d."

Lord Camperdown's fears that additional capital value would accrue to the Company by passing the Bill with the old initial price, are answered by Lord Farrer in the Board of Trade's Memorandum of July, 1876, in these words: "The provisions in respect to the raising of capital will probably save far more in the shape of new capital than would, by any increase of dividend, be added to the value of the existing capital. The principle of the scheme is to give to the gas companies the same motives as actuate ordinary traders for making their concern profitable by economy. It seems inconsistent with this principle to say that if they do so they shall not, if forced to part with it, receive the full value they have thus earned. If in case of increase of dividend the purchase-money is not to be calculated upon that dividend, it would seem fair also that in case of diminished dividend the purchase-money should not be diminished."

Lastly, as regards the public. In 1876, by the auction clauses, Parliament invited them, on certain well-known terms, to buy gas stocks. The invitation has been widely acted upon; and very high premiums, amounting to a large sum in the aggregate, have been given. If now, after more than twenty years have elapsed, these terms are altered to the damage of the investing public, no value can in future be given to, or reliance placed upon, any parliamentary bargain. In relation to this matter, the President of the Board of Trade (Mr. Bryce), in answer to a deputation on the price of London gas in August, 1894 (speaking of those who had bought stock

* See "Journal" for Aug. 1, 1876.

in recent years), used these striking words: "I do not think any of you would take the ground that due consideration should not be given to the good faith with which these people invested their money in undertakings carried on under parliamentary sanction. That is an important part of the question. A bad bargain may have been made, yet *a bargain made under a statute is entitled to be respected;* and Parliament could only be asked to reconsider it under the pressure of very strong evidence, and *under conditions which would prevent any disturbance of the faith placed, and rightly placed, by investors in the course taken by Parliament.*" These words need no comment.

Considering all the circumstances, it is to be hoped that the Company will abandon their Bill for this session.

Temple, April 5, 1899. SIMPSON ROSTRON.

The Metric System.

SIR,—The leading article on the Metric System that appeared in the "JOURNAL" of March 28 has, I must confess, in more ways than one, provided me with food for thought. At first I considered that the general tone of the article left much to be desired, inasmuch as what is undoubtedly an important and serious problem was approached, in a somewhat frivolous way, and from the point of view of what, it appeared to me, was extreme British conservatism and infallibility. I missed from the editorial remarks that width and fairness of view with which I had become acquainted. Nor, on referring to the file of the "JOURNAL," was I mistaken; for the leading article of July 9, 1895, on "The Report of the Committee on Weights and Measures," struck quite a contrasting note of dignity and open-mindedness. For instance, it was said on that occasion: "The evidence goes to show that not only is our foreign trade, in every branch, seriously handicapped, but that the home trade would be benefited if more simple and uniform standards of weights and measures than those now existing were adopted." Again, it was said: "There is no valid reason why England should cherish an antiquated system of weights and measures unintelligible to the rest of the civilized world, and anything but convenient to those who use it." Compare the two articles in question, and the remarkable difference will be at once apparent.

I should like to refer to some points in the more recent article. It is stated, on the authority of Sir Frederick Bramwell, that, "although for some special purposes it is useful to cipher in decimals, it is impossible to do mental arithmetic on this system." I have failed to understand what this means. It is surely easier to find out mentally what has to be paid for 30 articles costing 50 centimes each, than it is to know the same for 30 articles costing 5d. each. The Continental shopkeepers do not find it any more difficult to carry on their over-the-counter calculations than their British brethren, struggling with their shillings, pence, and farthings. On the contrary, anyone who has lived abroad knows the superiority and speed of these mental calculations by the metric system.

My own experience of living in Italy is entirely contradictory to the assertion "that the small dealers in, and consumers of, the necessaries of every-day life use the metric system very sparingly." I found, on the other hand, that the small dealers practically bought and sold everything by the established legal system of the country. Why is the kilogramme "too much for a retail unit of weight?" If one does not require a kilogramme, anything down to a thousandth part of it may be taken; whereas, for practical purposes, the British standard of a pound can only be divided to a sixteenth part, or one ounce.

Why is the metre "a clumsy measure of length?" It is only 3⅜ inches more than the yard; and so, if the metre is clumsy, the yard must be so also. But no practical man, who has done measuring up with metres and with yards, and their sub-divisions, will hesitate a moment in deciding with which is obtained the greater accuracy and speed. Centimetres and millimetres are much more easily added than inches and fractions of an inch; and the clumsiness seems to me to rest altogether on this side of the Channel.

Further, it is said, with what authority I know not, that "the partisans of the metric system admit that it is of no use for gas or mechanical engineering." This is an admission of which I have never heard. Neither, I think, had the "JOURNAL" heard of it in 1895, for it was then said: "Gas engineers at least will not object, on principle, to deal in cubic metres of gas in place of thousands of cubic feet." The "JOURNAL" also affirmed that, in one respect, gas engineers would look favourably upon the metrical system, the one respect being the manner of expressing the degree of purity of coal gas.

The question of screw-threads is not at all overwhelming. The very fact that at present all over the world there are so many different gauges simply emphasizes the existing complexity; and is an appeal for a universal standard. As for the "damaging argument that wherever the two most practical of the nations of the world have gone they have retained the old Saxon weights and measures," such a fact is to be attributed to the ignorance, obstinacy, and insular prejudice of the original colonists. Also, against this is to be borne in mind that there are 330 millions of people using the metric system to-day, as against only 113 millions using our cumbrous old Saxon weights and measures. And also, that nations are continually accepting the metrical standards; but never does one hear of any community being so foolish as to adopt the beautiful British standards.

Think of their attractiveness! Those 30¼ square yards to 1 square rod, pole, or perch. Think of the stone, now 14 lbs., now 8 lbs. (of meat), now 5 lbs. (of glass)! Think of the fodder of lead that starts from London weighing 19½ cwt., that gains 2 cwt. in passing Derby, and arrives at Newcastle weighing 21½ cwt.! Think of the 200 weights for corn alone used in this country! Think of the chaotic conglomeration of grains (avoirdupois, apothecaries', and troy), drachms, firkins, puncheons, pecks, strikes, coombs, loads, and lasts! The practical advantages of the metric system should be too well known to need repetition. In taking out quantities, engineers would not despise only two (or really one) columns in place of four, besides the saving in addition, subtraction, multiplication, and division. In making drawings, there is, with the metric system, much greater variety and freedom in the choice of the scale to be used. Which is the easier to draw to, ⅜ths of an inch to a foot, or 10 mm. to the metre? In gas-works, the advantages arising from the metric system are very great in many ways—for the capacity of coal stores, for the weight of water or tar or liquor in tanks, for the sale of coke, &c., and, as the "JOURNAL" pointed out, for the percentages of impurity.

The question of the adoption of the metric system of weights and measures is likely to become of ever increasing importance and seriousness. It must never be forgotten that England and English trade do not stand where they did but thirty years ago. The race for the world's markets is much keener now than then. France, Germany, Austria, Japan, and other competitors all speak the same common language of the metric system, and so have an advantage over us in both old and new markets. Let us not underrate our rivals. Let us remember that we live in days when America can supply Glasgow with pipes, the Midland Railway with locomotives, and the Soudan with bridges; and when Germany and other countries not only keep new markets from us, but drive us out of the old.

Let us do all in our power to keep and extend our trade in all markets, at home and abroad; and in order not to be handicapped, let us sweep away the drawbacks of a cumbrous, complicated, and chaotic system of weights and measures, and adopt that system which the majority and reason indicate.

C. E. BRACKENBURY, Assoc.M.Inst.C.E.

Continental Union Gas Company, Ltd., 7, Draper's Gardens, E.C.

[This letter is dealt with in "Editorial Notes."—ED. J.G.L.]

Ilford Gas Bill—The Sulphuretted Hydrogen Test.

SIR,—In your "Gleanings from the Committee Rooms" on p. 796 of the "JOURNAL" for March 28, you refer to a remark made in a previous issue in respect of the tests which the Ilford District Council carried out, at their own offices, for the purpose of supporting their case against the Ilford Gas Company. In this connection you say: "In an allusion last week to the sulphuretted hydrogen test mentioned above, it was stated that the value of those made by Mr. W. A. Valon was somewhat vitiated by being daily tests instead of the usual three minutes' test prescribed by the Act for penalties. This statement requires a little qualification." And then follows a description in detail of the tests prescribed by the Gas Referees.

But for the well-known impartiality of the "JOURNAL," one would be tempted to suggest that the paragraph was inspired from some source which could not claim to be entirely disinterested; and as I am confident that you would not desire a statement which is eminently misleading to remain uncontradicted, I ask you to be good enough to publish this letter in your next issue.

Had the statement referred to been published by itself, no fault could have been found with it; but associated as it is with the proceedings in Parliament in connection with the above Bill it is calculated to produce a very erroneous impression. The "Gas Referees test" you describe applies to the *three London Gas Companies;* but most certainly it *has nothing whatever to do with the Ilford Gas Company.* The reference to this on the part of the Ilford Council's witnesses could, therefore, have had no justification whatever in fact. The Company were, and are, under the Gas-Works Clauses Act, 1871, which distinctly describes the test for sulphuretted hydrogen to be one of three minutes' duration.

It was freely admitted by the Company that a slight temporary contamination of the gas had occurred; but it was clearly shown that the cause of this had been removed immediately the fact was made known to the Company's Inspector. The delay in reporting this to the Company seems to me quite in keeping with the unjustifiable references to tests applicable to the London Gas Companies only. The Company's witnesses were fully entitled to urge the illegality of a 24 hours' test when a three minutes' test was that by which alone the Company were bound; and I venture to suggest that your criticism of the Council's method of obtaining evidence needed no qualification whatever.

54, Parliament Street, S.W., March 30, 1899. PERCY GRIFFITH.

Hastings Carburation Process.

SIR,—In your issue of the 28th of March there is a letter from Mr. W. G. Hicks, advancing a theory to account for the practical success of the above process, which perhaps calls for some reply. With the first paragraph of the letter I quite agree; for it has always been my experience that a fall of temperature, with the consequent alteration in vapour tension, results in the condensation of the water vapour, which water vapour, in so condensing, brings down some naphthalene with it.

There is, of course, some replacement of water vapour with oil-mist, as has many times been pointed out. The oil, however, which is used for the mist is not a light oil—as carburine or light petroleum spirit of ·680 to ·700 specific gravity—for such oils have not proved successful for carburation. As perhaps is now pretty well known, the oil successfully used has a specific gravity of about ·800. It is really American lamp oil; and it is scarcely, therefore, what would be called "light oil." Mr. Hicks's theory is that this oil-mist, upon change of temperature, deposits and brings down with it any naphthalene which, at that vapour tension, the gas cannot carry. This is probably true to a limited extent; but the actual condition of things has to be considered. I would therefore again point out that, when the carburation process was started, our distributing system of mains and services was very much blocked with naphthalene deposits, which of course had to be dissolved away, or otherwise got rid of. Thus the liquid from the syphons of the town mains (these syphons must not be confused with the syphons within the area of the works) has been gradually changing in character; and at the present time that from our large trunk mains is really composed of oil and water, whereas that from the syphons farther afield is composed of water and oil which contains some naphthalene, and is in some cases influenced by tar having been dissolved off the coated cast-iron mains.

In connection with the theory now being considered, it will perhaps be interesting to see what amount of naphthalene would have to be deposited and removed from the syphons of the town mains in the way indicated. The exact figures for 1898 not being at the moment available, I take the year 1897. In 1897 we carbonized (say) 34,480 tons of coal; and as only a proportion of the naphthalene contained in the gas would necessarily be deposited on an alteration in the vapour tension, I take what I believe will be considered a very fair and low figure for the deposited naphthalene—namely, 0·75 lb. for every 10 tons (100,000 cubic feet) of coal carbonized. This would mean 2586 lbs. of naphthalene to be dissolved. At the ordinary temperatures concerned, the oil used in the

process is saturated with naphthalene when it contains about 6 per cent. of its weight of that hydrocarbon; and as the oil weighs about 8 lbs. per gallon, it will be found that, in order to remove the above-mentioned quantity of naphthalene in solution, 5388 gallons of oil would be required, whereas as a matter of fact only 1532 gallons were sent forward into the district as oil-mist in the year given.

In conclusion, I would desire to point out that there is absolute proof of the oil-mist being permanent right up to the burners—proving that same is not deposited, and also that carburated gas will absorb crystallized naphthalene readily at lower temperatures, with a resulting increase in the illuminating power. I trust what I have said may be clear to any others who, like Mr. Hicks, are interested in this matter.

CHAS. F. BOTLEY.

Hastings, April 8, 1899.

Sulphate Working at Widnes.

SIR,—Mr. Tysoe in his letter in the "JOURNAL" of the 28th ult. says that it still remains for me to demonstrate in what manner any form of superheater can influence the amount of acid used. I might remind Mr. Tysoe that we have not yet reached finality, even in chemical science, much less in chemical manufacture; the undiscovered portion is probably as great in extent as that already traversed. Even in gas manufacture, which has received a much larger share of our attention, we cannot pretend that the knowable is absolutely in our possession.

Mr. Tysoe says 18½ cwt. of 149° acid is neither more nor less than is required with or without a superheater—a generalization which shows either a want of experience or absolute thoughtlessness. With the continuous plant we use, he would find it difficult to make sulphate at all with the liquor going in cold and cooling the hot gases *en route* for the saturator; and any sulphate that might be produced would be unmarketable. He would thus have to resort to some other means of heating the liquor before it entered the still; and the nearer he could get it to boiling-point, the more successful his operation would be, and the less acid he would require to produce a ton of sulphate. This is not only my experience, but the experience of others.

In my past letters, I have tried to explain how it could be and why it should be so. It may be that my explanation is faulty; that I have failed to discover the true reason. But let this be as it may, there is no doubt about the facts. When Mr. Tysoe talks about getting a certain quantity of sulphate from a given quantity of acid with or without a superheater, he speaks as a student theoretically; and from that point of view he may be right. But from a sulphate maker's point of view, he is altogether wrong. The theoretical equivalent is a thing to be aimed at; but it has never yet been attained in practical working. When I submitted my report to my Committee, I did not claim for my superheater that it altered, or in any way changed, the chemical action taking place in the saturator, but that it was instrumental in minimizing the waste of acid, which in our case had been considerable.

Whether my explanation of how it has been done is of any value, I need not now discuss further. The improvement claimed, both with regard to the consumption of acid and other things, has been amply demonstrated not only at my own works, but at another works where one of my superheaters has been at work for the last three months.

ISAAC CARR.

Widnes, April 7, 1899.

The Jasper Incandescent Mantle.

SIR,—With reference to the letters in your last issue in regard to this mantle, the writers seem to be somewhat hypercritical; and we cannot help thinking of the grapes that are sour. The Jasper mantle is a new departure, only dating from 1898; so that, in respect to the statement about the demand in Germany to which Mr. Marcus objects, consideration should, of course, be given to the short time it has been commercially worked in that country. "Rome," as everybody knows, "was not built in a day." When Mr. Marcus has added another five years to his experience in the incandescent mantle trade, no doubt he will be in a better position to own to the advantages and merits of the Jasper mantle.

The mantle has been subjected to several very rigorous tests, under the criticism of many observers well versed in lighting (especially incandescent gas) matters who were one and all highly pleased with the results obtained; and our faith in it remains unaltered. We hope to have a testing apparatus at work here very shortly; so that any readers of your paper who would like to appraise for themselves the merits of the Jasper process of greatly strengthening incandescent mantles can call and make their own observations. There is a well-known proverb to the effect that "the proof of the pudding is in the eating;" and our firm opinion (shared by many others) is that we shall be able to demonstrate fully that, in the Jasper process, we have secured a very good "pudding," and that we may justly call ourselves "*Beati Possidentes*,"

THE AUTOMATIC LIGHTING COMPANY, LIMITED.

Finsbury House, E.C., April 8, 1899.

The Relative Sizes of Hydraulic Main Inlet and Outlet Pipes.

SIR,—In the construction of a new retort-house, a point has come under my observation which I should like to bring before your readers.

The house in question contains six settings of inclined retorts, each setting having nine retorts. Eventually, there will be another six settings, making twelve altogether. These retorts have 6-inch ascension-pipes, and the outlet from the hydraulic main is only 8 inches in diameter; so that we have an initial capacity of 324, having an outlet of 64. Of course, the condensation which takes place in the hydraulic must be remembered, which will reduce the volume of gaseous vapour somewhat; but this is far more than counterbalanced by the fact that, to get the requisite seal, the outlet-valve of the hydraulics referred to must be closed to such an extent that there is actually only a 2½-inch outlet from each setting. The result is that there is the greatest difficulty in getting the gas away from the retorts—particularly as a very rich coal is used, giving a great rush of gas immediately after charging. Again, after leaving the hydraulic, the gas from all the settings is taken through a 12-inch main. Here we have a capacity of six 8-inch into one 12-inch—*i.e.*, 384 into 144. From here the size of the main is increased, where it is quite unnecessary; and the gas is taken through the other apparatus by means of an 18-inch main, after having, in the first place, traversed, at its *highest temperature*, a 12-inch main.

This method of retort-house construction, which I know is pursued in many works, seems to me to be entirely opposed to correct gas engineering principles, and the relic of a very old custom; and I should be glad if some of your readers would express their opinions on the matter.

F.

April 8, 1899.

The Displacement of Gas-Lamps by Arc Lights at Newport (Mon.).

SIR,—I notice in your contemporary "Lightning" a statement that "34 arc lamps displaced about thrice that number of gas-lamps in Newport streets on Saturday night." I desire, with your permission, to point out that this statement differs very widely from the fact. It is quite correct that 34 arc lamps have been added in this borough; but they displaced only 48 gas-lamps—viz., 18 large Sugg lamps and 30 ordinary street-lamps. But, as your contemporary is more or less a comic journal, I may perhaps have been taking its statements too seriously. Still, at all events, I am giving your readers an opportunity of judging two things—first, the actual extent to which electricity reaches in supplanting gas; secondly, the extent which some electricians would like to claim.

THOMAS CANNING.

Newport (*Mon.*), *April* 4, 1899.

LEGAL INTELLIGENCE.

CORNWALL QUARTER SESSIONS.

Bodmin, Thursday, April 6.

(*Before Messrs.* W. C. PENDARVES, *Chairman*, E. B. HOWELL, *and* J. S. TREGONING.)

The Assessment of the Falmouth Gas-Works.

This was an appeal by the Assessment Committee of the Falmouth Union against the decision of the Magistrates of the East Kerrier Petty Sessional Division, in respect to the rating of the works of the Falmouth Gas and Coke Company (*ante*, p. 32). The valuation of the works was originally £434, and was raised by the Assessment Committee to £979. Against this the Company appealed to the Justices in Petty Sessions, who, in the absence of the Assessment Committee, who declined to appear on that occasion, reduced the valuation to £520.

Mr. FOOTE, Q.C., and Mr. W. T. LAWRANCE appeared for the appellants; and Mr. H. E. DUKE, Q.C., and Mr. M'LEOD for the respondents.

Mr. FOOTE, in opening the case, said there would be no dispute as to the system upon which gas-works were valued. In estimating the amount they took the gross receipts of the Gas Company, deducted from them the expenses a tenant would incur in order to earn these receipts, and then allowed the tenant a reasonable percentage on the capital he required. From the balance they deducted the amount of the rates and the cost of the landlord's repairs; and what was left was the sum which the tenant could afford to pay as rent. In the present case, the chief differences which would arise were as to the amount which the tenant was entitled to consider as his capital, and therefore the sum to be charged as interest; and also the amount to be allowed for repairs. The valuation of the Falmouth Gas-Works had been made by Mr. Valon on the Company's accounts for the year ended June 30, 1898. The gross receipts for the year were £6230. The expenditure in the same period was £4989; but for rating purposes they had to deduct items which were not proper expenditure by a tenant, and the rates, which were dealt with in another way in the valuation. By this means, they arrived at the conclusion that the expenditure which properly belonged to the tenant was £4547. Deducting this amount from the gross receipts, they had a surplus of £1683 as the net receipts of the Company. Since June last, however, the Company had raised the price of gas 4d. per 1000 cubic feet, thereby going back to the old charge from which there had been this reduction for one year. From the higher charge the Company would this year receive an additional revenue of £561. Therefore this amount must be added—making £2244 of net receipts to be divided between landlord and tenant. In making this division, the first thing was to allow the tenant a proper interest on his capital. Now one of the most difficult items in calculating the rateable value of a gas-works was to determine the tenant's capital. In this case his witnesses put it at £4332; and the proper interest on this was £691. Deducting this amount from the net receipts, and making a further deduction of £360, the actual rates paid, there was left £1193, which was the rateable value. The assessment fixed by the Committee was £979; so that there was a margin of £214 for any corrections the Court might make.

Mr. *W. A. Valon* said that in estimating the expenditure which would properly fall on a tenant, he allowed £699 for repairs and maintenance—this being the average of the past five years—instead of £727, the amount expended last year. In calculating the tenant's capital, he deducted the landlord's share of the cost of repairs to works from the total expenditure. This reduced the tenant's working expenses on the year to £3965. As, however, gas accounts were payable at the end of the quarter, it was only necessary to allow 4½ months' working expenses, which came to £1487. For meters and cookers in use, fittings, stoves, and stores, he allowed £2646. Extra stock of coal and other items brought the total up to £4332 as the amount of the tenant's capital. In calculating the interest on this capital, he allowed 17½ per cent. for that part of the capital which was invested in coal and working expenses, and 15 per cent. for the remainder invested in plant and meters. On this calculation, the interest amounted to £691, which, deducted from the net receipts of £2244, left £1553. By further deducting from this sum the actual rates paid of £360, he arrived at the amount of £1193 as the rateable value of the works.

Mr. *Arthur Body*, estimated the tenant's capital at £4085; but for the purpose of calculating the rateable value, he took it at £4300. On this he allowed interest at the rate of 16 per cent., which he considered ample. This allowed the tenant £688 as interest on his capital. His estimate of the rateable value of the undertaking was £1196.

Mr. *William Eve* confirmed this valuation; the only difference being

that he estimated the tenant's capital at £4175, though for the purpose of arriving at the rateable value he, like Mr. Body, took it at the round figure of £4300.

Mr. DUKE, in opening the case for the respondents, said that in 1888 the rateable value of the undertaking was fixed by Mr. Morgan Howard at £665 gross and £434 net. Since then its profit-earning capacity had not increased. It was true that in 1888 the output of gas was 23 million cubic feet, and in 1898 it was 33 million cubic feet; but the profit earned in the two years was the same within £30, because under the sliding-scale the price of gas had been reduced from 3s. 9d. to 3s. per 1000 cubic feet. What was proposed by the Assessment Committee was not to diminish the profits of the Gas Company. Under the Company's Act of Parliament, a ratio was fixed between the dividends and the price charged to the consumer for gas; and if the rates were increased by a substantial amount the result would be not so much a loss of profit to the shareholders as an increase in the price of gas to the population of Falmouth. In this case, the profit earned was the measure of the rateable value; and the fact that they had to manufacture one-third more gas to earn the same profit was to be borne in mind. In 1888, when the undertaking was valued by Mr. Morgan Howard, the Company had a nominal capital of £12,000 in £1 shares, of which 10,765 shares had been issued. In 1890, the works were vested in a new Company, with a nominal capital of £13,500; and this was its present capital. There was no substantial difference either in the profit earned or the rateable value of the property when Mr. Morgan Howard made his award and now; and he submitted that £490, which corresponded very closely with the old assessment, was the proper rateable value. On their side, they estimated the tenant's capital invested in the concern at £6000. At 17½ per cent.—the rate hitherto always allowed—the interest would amount to £1050; and deducting this from £1981, the net receipts of the Company, they had £931 as the gross estimated rental. Out of this, they had to make the statutory deductions of rates and the amount necessary to keep the premises in a condition to command the rental. Deducting these items, they arrived at the sum of £490 as the true rateable value of the property.

Mr. *Corbet Woodall* gave evidence in support of this valuation. He said that, according to his calculation, the tenant's capital was £6500; but taking it at £6000, and the interest to which he was entitled at 17½ per cent., the rateable value worked out at £490.

Mr. *J. W. Buckley*, the Engineer and Manager of the works, supported Mr. Woodall's valuation.

Mr. DUKE, in closing the case for the respondents, submitted that it was perfectly clear that Mr. Morgan Howard was right in his judgment, when he fixed the rateable value in 1888; and the Gas Company were right now in resisting this proposal to increase their burdens. The appellants, in their valuation, had cut down the tenant's interest in the undertaking in order to unduly increase the assessment.

Mr. FOOTE, in reply, argued, on the contrary, that the respondents, by their method of valuation, had inflated the tenant's interest beyond its proper proportion, in order to minimize the rateable value.

Friday, April 7.

On the Court reassembling this morning,

The CHAIRMAN said the Bench had given careful consideration to the large mass of figures which had been furnished them. The different valuations of the Falmouth Gas-Works worked out very well together, with the exception of that of Mr. Woodall, who had not proceeded in quite the same way as the others. The Bench were of opinion that the figure arrived at by the Assessment Committee was too high. The Committee had not made sufficient allowance for the tenant's capital. The assessment would therefore be reduced from £979 net rateable value to £820. Both sides would pay their own costs.

The Falmouth Assessment Committee also appealed against the decision of the Justices in Petty Sessions with reference to the valuation of the Penryn Gas-Works. The old valuation of these works was £75 5s.; and the Committee increased it to £166. On appeal by the Company to Petty Sessions, the amount was reduced to £91 10s.

Mr. FOOTE now intimated that the parties had agreed to settle this matter on the basis of what the Court might decide in the case of the Falmouth Gas-Works.

WEST RIDING QUARTER SESSIONS.—Wednesday, April 5.

(*Before Colonel* T. BROOKE, *Chairman, and other Magistrates.*)

Appointment of an Auditor of the Accounts of the Ossett Gas Company.

This was a petition presented by the Mayor and Corporation of Ossett and two other consumers of gas supplied by the Ossett Gas Company, praying for the appointment of an Auditor to examine the books and accounts of the Company.

Mr. WALTER BEVERLEY appeared in support of the petition; Mr. T. R. D. WRIGHT opposed on behalf of the Company.

Mr. BEVERLEY explained that the proceedings were taken under section 35 of the Gas-Works Clauses Act, 1847, the last clause of which provided that, if the profits made by a Company were more than the amount prescribed, 10 per cent., a reduction should be made in the price of the gas supplied to the consumers. The complaint of the petitioners was that the Company had made more than 10 per cent.; and, therefore, that they as gas consumers were entitled to benefit. In the petition, they set out that they were dissatisfied with the quality of the gas supplied, and the prices charged for it, and that the Company had for years been spending large sums of money out of the reserve fund on capital account. He submitted that they were entitled to an inquiry such as was provided for by the section in question; and it seemed to him that his application was more in the nature of a formal application than anything else. The petition was signed by the Corporation of Ossett, who were consumers, and, in addition, by two separate consumers, as provided by the Act. He did not hesitate to say that there had been some difference between the Company and the Corporation, but this had nothing to do with the case at all. He believed that the last application of a similar kind heard at these sessions was in 1888, when an order was granted for an examination of the accounts of the Rastrick Gas Company.

Mr. WRIGHT intimated that he did not admit the truth of the allegations contained in the petition.

Mr. *F. L. Fothergill*, Mayor of Ossett, said that the Corporation had had reason to complain of the gas supplied, and the charges made, by the Company. He believed that the present price was 2s. 9d. per 1000 cubic feet, and that it had been reduced from 3s.

Cross-examined, witness said that for some years the Corporation had been considering the advisability of buying the Company's undertaking. At a special meeting of the Corporation on March 13, Alderman Cox, who should have signed the petition, refused to do so, because he said that it contained a statement that was not true. One of the two signatories was his (witness's) foreman. He did not know what the price of gas was less the discount, but discount was not allowed to small consumers.

Mr. *F. Audsley*, a member of the Corporation, said one of the complaints against the Company was that they had over-spent their authorized capital by £4000 without borrowing this amount. It was contended that they ought to have borrowed the money at a low rate of interest, and reduced the price of gas. The Company had always paid full dividends. He had gone into the accounts and balance-sheets, and compared the charges from year to year; and he believed that the plant had been "enriched" at the expense of the consumer.

Mr. WRIGHT submitted that the quality of the gas was not a sufficient ground upon which to ask for an order under the section. The Magistrates could not grant such an order without imposing a burden on the Company; and his friend had shown no grounds for that. He submitted that the true reason for instituting these proceedings was found in the desire of the Corporation to purchase the undertaking.

The CHAIRMAN said the Magistrates considered it their duty to appoint an Auditor to examine the accounts of the Company for one year; and they appointed Mr. Beevers, Chartered Accountant, of Leeds, who was mentioned in the petition.

Mr. WRIGHT said he had no objection to Mr. Beevers.

The Rating of the Dewsbury and Heckmondwike Water Board's Works—A Novel Point.

This was an appeal entered by the Dewsbury and Heckmondwike Water Board against the poor-rate made, on Oct. 26 last, by the Assessment Committee of the Penistone Union and the Overseers of the Poor of the Parish of Denby.

Mr. BALFOUR BROWNE, Q.C., and Mr. W. J. WAUGH appeared for the Board; Mr. CASTLE, Q.C., and Mr. HAROLD THOMAS for the respondents.

Mr. BALFOUR BROWNE explained that the point raised in the case turned upon the construction of the Dewsbury and Heckmondwike Water-Works Act, 1876. This Act put the Board in a very peculiar position; and it was having regard to the position of the Board under the Act that he said the Assessment Committee of the Penistone Union had done wrong in rating the Board at a substantial amount instead of at a nominal sum. He (Counsel) proceeded to explain the provisions of the Act in detail, and pointed out that the hereditaments, the rating of which formed the subject of the appeal, were vested in the Board upon trust for the Dewsbury Corporation and the Heckmondwike District Council—a three-fourths part for Dewsbury, and a one-fourth part for Heckmondwike. Although the property was vested in the Board, it was as a pure trust; and, so far as he knew, this was a unique position for any Board to occupy under an Act of Parliament. Although the reservoirs and mains were vested in the Board under section 9, the distribution works were vested in the Dewsbury Corporation and the Heckmondwike District Council. But the appeal was in regard to the rating of the reservoirs and mains, which were in the Penistone Union, and which were the works vested in the Board. The whole of the profits of the works arose from the distribution and the sale of the water; and the whole of the distribution and sale was in the hands of the Corporation and the District Council. The water-rates were received by them; and the Board had practically no interest in the matter at all. The Board expended money in maintaining the works vested in them; but they could not receive any profit. The test of the Parochial Assessments Act was that the rating authority had to find out what rent the hereditaments might reasonably be expected to let at from year to year to a hypothetical tenant, but always subject to the same statutory restriction. In the circumstances, he said that they could not find a tenant who would give any rent at all for the works. They were rateable hereditaments; but they ought to be rated at a nominal amount. Very probably the value of the pipes which distributed the water was enhanced by the works. But the pipes were not in the hands of the Board; and the enhanced value ought to be taken into consideration in rating the pipes in Dewsbury and Heckmondwike. The incidence of taxation should not be taken away from these towns and carried into the Penistone Union. He had suggested that, as an important point was raised in the appeal, a case should at once be stated for the opinion of a Superior Court; but his learned friends' clients had thought differently. He felt he was right, however, in saying that whatever was the decision of the Court, the Magistrates would allow the case to be heard in another place.

Mr. CASTLE pointed out that last year the water-works produced a profit of £3800. He submitted that the manner in which this profit was disposed of did not enter into the question of rating at all. This was a rateable property producing a profit; and the Assessment Committee were bound to rate somebody. The rating could not be escaped by a trick of this kind—by the contention that the Board were only trustees of the property, and that the beneficiaries were outside the area. The Act put no restriction upon the profitable occupation of the property; it simply directed where the profits should go.

The CHAIRMAN said that the Magistrates could not take the view which Mr. Balfour Browne had placed before them; and they would confirm the rate. The appeal, therefore, would be dismissed with costs. A case would be granted if it was asked for.

Mr. BALFOUR BROWNE asked for this.

A second appeal by the Board, against the poor-rate made by the Assessment Committee of the Penistone Union and the Overseers of the parish of Thurlstone, was also dismissed.

Thursday, April 6.

The Rating of the Dewsbury Gas-Works—A Settlement.

The Corporation of Dewsbury appealed against the poor-rate made in April, 1898, by the Assessment Committee of the Dewsbury Union, and the Overseers of several parishes in the Union, in respect of the Dewsbury Gas-Works. Mr. Balfour Browne, Q.C., and Mr. W. J. Waugh appeared for the appellants; Mr. E. Tindal Atkinson, Q.C., and Mr. A. P. Longstaffe represented the Committee. Mr. Balfour Browne explained that the assessment was fixed in 1886; the total rateable value of the whole of the works and mains being then determined by the Committee at £7314 10s. In that year, there was an appeal; and the rating was confirmed. It had remained the same for fourteen years; and the Corporation said the value was far higher than it should be. In testing the value of property of this kind, it was usual to ascertain the rent a hypothetical tenant would pay by a calculation of the receipts. The total receipts of the undertaking for the year ended March, 1898 (including an allowance of £1303 for gas supplied for public lighting), amounted to £31,276, and the total working expenses to £18,253; leaving the net receipts £13,023. Taking into consideration the money which a hypothetical tenant would have to provide for various purposes before he could enter into possession of the works, the learned Counsel submitted that the rateable value should be £5727. Before any witnesses were called, Mr. Balfour Browne informed the Magistrates that an agreement had been arrived at by which the appeal would be withdrawn upon terms to be endorsed on Counsel's briefs. These terms were that the assessment should remain at £7314 10s. for five years from the date of the last rate. He might state that one of the reasons for coming to the agreement was that they had recently been improving the works to some extent, and it was quite possible that, even if they had succeeded that day, they might not do so in an appeal next year. Both parties had therefore agreed to give and take to a certain extent.

Theft of Gas at Ipswich.

At the Ipswich Police Court last Thursday, before the Mayor (Mr. E. P. Ridley) and other Magistrates, Arthur George Dallenger, of 4, Dock Street, Ipswich, was charged with stealing 3000 cubic feet of gas, value 10s., the property of the Ipswich Gas Company. Mr. S. A. Notcutt appeared on behalf of the Company. Mr. F. Paternoster, draughtsman to the Company, deposed to examining the gas-fittings at defendant's house and preparing a plan showing the different connections. Albert Hazell, collector to the Company, said he visited defendant's house, where a slot meter was fixed in the cellar, at the end of last September, and found the reading of the meter to be 9500 cubic feet. He noticed an escape from a branch joint just outside the meter. In October and November, when he called, the connection was all right; but in December he found there was an escape of gas at the same place as in September, and the meter index showed that 10,150 cubic feet of gas had passed. When he called in January, Mrs. Dallenger asked him to go next door first; and he did so. When he returned, he went into the cellar, and found all was right. In February and March, he was again asked to call next door first; and each time he did so. On the latter occasion, however, he detected a strong smell of gas when he went into the cellar, where he found both defendant and his wife. He examined the connections with the meter. The unions on each side were loose; and when defendant's attention was called to the fact, he said the man who last attended to the meter must have left them so, as he had nothing to undo or tighten them up with. Witness called again on the following Saturday, and was asked once more by Mrs. Dallenger to wait a few minutes; but as she turned to go into the cellar he followed her. When he was nearly down, he saw Mrs. Dallenger, who had in her hands an india-rubber tube which she dropped into a hole where the bricks had been taken up. Witness charged her with tampering with the meter; but she replied that she had nothing to say. The meter was disconnected from the main cock, and the tubing smelt strongly of gas; showing that it had been used for some time. He called shortly afterwards with Mr. Noble, the Company's outdoor superintendent, when, in answer to questions, Mrs. Dallenger said the piping had only been on about an hour, in consequence of her not having a penny to put in the slot. Defendant had four burners for lighting purposes, and a boiling-ring; the former consuming about 5 cubic feet per hour each, and the latter 14 to 15 cubic feet. Mr. T. J. Noble deposed to bringing the meter [produced] from defendant's house. He showed that the supply-pipe must have been tampered with. Both defendant and his wife gave evidence denying having in any way interfered with the meter. The piece of india-rubber tubing, it was asserted, had been used in a legitimate way, for connecting the gas-cock with the boiling-ring. The Mayor, after consulting with his colleagues, said they were convinced the gas had been stolen by the defendant, who had exercised a good deal of ingenuity in committing the theft. He would be fined £2 and costs, 25s. 6d., or in default one month's imprisonment. An application by the defendant for time to pay was peremptorily refused.

Systematic Pilfering of Coke at Bristol.

At the Bristol Police Court on the 29th ult., two boys named John Guidray and Daniel Robbins were charged with stealing a quantity of coke, the property of the Bristol Gas Company. Detective Slade stated that he was at Canons' Marsh, on the previous day, when he saw the defendants knock the coke off passing carts, and pick it up. The carters saw them do it, but took no notice. Mr. F. W. Townsend, foreman at the works, said there was an organized gang of boys who made it a practice to do this sort of thing; and he regretted to say that the hauliers took no notice of it. The result was that when the coke was delivered the customers complained of it being short weight. Detective-Inspector Robertson said they had had several complaints; and that was why they had put special officers to watch. The boys collected the coke they knocked off the carts and sold it. The Bench sent Robbins, who was an old hand at the game, to prison for seven days, and discharged Guidray on his parents promising to punish him.

MISCELLANEOUS NEWS.

COMMERCIAL GAS COMPANY.

The Half-Yearly Meeting of this Company was held at the Cannon Street Hotel last Thursday, under the presidency of Mr. John Blacket Gill.

The Secretary (Mr. H. D. Ellis) read the notice calling the meeting and the minutes of the last meeting; and the report and statement of accounts were taken as read.

The Chairman, in moving the adoption of the report and accounts, remarked that he had not much to tell the proprietors on this occasion. They had often been twitted with sending out a very brief report; and in this respect they certainly were different from their neighbours. Their report was, in fact, particularly brief on all occasions; but he thought that as long as the shareholders saw the very agreeable announcement as to the dividend, they would be contented to give up a good deal of what was contained in other reports. He would not detain them long on the figures, but simply mention a few, which he thought would probably be of interest to them. Coals and oil had cost them £2649 more; the carbonizing wages had been £3693 less; the item of purification showed an increase in wages of £763; the repairs and maintenance had been £2538 more; the rates and taxes were, of course, more—this time by £151; and the bad debts were £110 more. On the other side, they had received £4017 more for gas, and £1050 more for meter and stove rental; while their residuals showed an increase of £3708. It had cost them £145,125 to earn £197,588; and, with the balance of £52,462, they proposed to pay their usual dividends of 13½ per cent. on the old stock and 10½ per cent. on the new stock, and carry forward £1876 for the benefit of the next half year. The increase in the sale of gas in the half year was very nearly 3 per cent.; and when he told them that The Gaslight and Coke Company showed an absolute decrease of 2 per cent. and that the South Metropolitan Company, who had a better district, exhibited an increase of only 5 per cent., he thought they had reason to congratulate themselves. Their Engineer reported that he considered the increase in the sale of gas very satisfactory, having regard to the mild winter. Of the total increase of 34 million cubic feet, 19 millions had been contributed by the increase in their coin meters, which now numbered, he was glad to say, over 10,000. They must remember that during the past half year they had been working with dearer coal; and he might state that the question of coal had lately given them a certain amount of anxiety. They were probably aware that the wages of the miners had been increased in the North, and the effort had been made to put this increase on the purchaser; and it had required a great amount of negotiation to obtain what they considered anything like reasonable terms for the next year. He was glad to say, however, that they had fairly succeeded, and they would only have to pay a very small sum in excess of what they had to pay during the past year. One remembered coals varying very much in price. He thought that they had obtained coals at under 6s. per ton at the pit mouth; while they had also given considerably over 20s. a ton. At the time when Lord Randolph Churchill made the fatal error of knocking off the City dues, they thought they would get their coal at 1s. a ton less; but he believed that ever since that time they had paid more, while the 1s. a ton had gone into the pockets of the astute north countrymen, and the misfortune was that London had lost £500,000 a year which it never knew that it paid. Electricity was somewhat to the fore, although he did not know that it was going to do their Company very much harm. He believed, however, that in the Whitechapel district they were making efforts to bring it about. This reminded him that he had noticed the other day the accounts of one of their collectors, from which he saw they were about £300 short. On making inquiries, he found that this arose from the fact that the Guardians of the poor had provided electricity for the paupers. When one considered that they could have this Company's gas at 2s. 6d. per 1000 cubic feet, and yet that they had spent the ratepayers' money in providing electricity for paupers, one would not trust oneself to comment much upon the fact. He might mention a circumstance which probably was of interest—that the Great Central Railway Station was lighted by gas. This was the largest station introduced into the Metropolis, and he thought they might assume that they had the very best light they could get; although he had not seen it. When one came to think of the melancholy exhibition at the station where they were meeting, which was lighted by electricity, one could not help thinking that the lighting of the Great Central station must be bad indeed if it was not better than at Cannon Street. He supposed that there was no City which was worse lighted than our own; and when travelling abroad he had noticed—as, no doubt, some of the shareholders had noticed—how infinitely superior the Welsbach incandescent gas light looked in the streets as compared with the electric arc light. At Dresden, half the town was lighted by the electric light and the other half by the double Welsbach light, and no unbiassed person could say that the gas was not far superior to the electric light. In their own case, where they supplied gas cheaply, they ought to be able to keep out the electric light for many years to come. Probably they had noticed that there was to be a gas inquiry shortly; and he supposed that an inquiry would be made into their proceedings, and as to the sliding scale. Their Engineer would probably be able to enlighten them considerably on this point if he were called upon to give evidence. He might briefly mention one fact, as he called attention to it at their last meeting,—namely, the enormous saving which their customers had made since the sliding scale was introduced in 1885. He would only now say that while the shareholders had benefited in the interval by £400,000 in the shape of extra dividend, the consumers had saved no less than £2,000,000. He thought that this was a fact which ought to be thoroughly known, as it would then be recognized that the sliding scale had been a very great boon to all concerned—shareholders and consumers alike. There had been a little move during the half year for an increase of wages. He believed that the South Metropolitan Company found it necessary to give somewhat of an increase; and this proceeding spread to The Gaslight and Coke Company, and their Company had, of course, to follow suit. Their wages therefore were somewhat increased in the half year under review. He always thought that gas workers were particularly well paid; but he was sure that they would not grudge them their wages if they would only give a fair day's work for a fair day's pay. The new stock was issued to

the proprietors, and, strange to say, £3049 of it and £3079 of the debenture stock were not taken up. One could never quite understand how it was that when one made a present of a handsome bonus it was not always accepted. Still, they were themselves the better pleased, because they would sell the amount that was not taken up at the best price they could obtain—probably by auction—and it would go in relief of their capital. They did not draw the line very hard and fast as to the date of payment for the stock; and shareholders who showed any good reason why they did not take up the stock at the proper time were given a little grace. One of their letters, however, was from all places in the world, Omdurman. The allotment had been sent out to a gallant officer who was serving there, who, he supposed, had had too much to do in looking after the dervishes to fill up an allotment. It therefore came back to them rather late; but they had not hesitated to give the gallant officer his allotment. He hoped that in the coming half year they might do as well as they had done in the past six months. They would remember that he told them that there might be a chance that they would not be able to earn their dividend—having to deal with dearer coal and having to pay on considerably more capital; but he had every hope that their Engineer would pull them through, and probably he would. He also hoped that sulphate was going to improve. He noticed the other day that there had been some trial; and that there had been a very large increase in the yield of potatoes where sulphate was used. They might, perhaps, refer this matter to their friends in Ireland. They would have to work with a little dearer coal and with more capital; but they would do their very best to keep up the dividend at the same rate.

The Deputy-Chairman (Mr. William Graham Bradshaw) seconded the motion.

Mr. Ennis said he thought that the Chairman's speech contained a great deal which was of interest to them. With reference to the question of coal dues, he believed that the original amount was 1s. 1d. per ton, all of which went to the City of London. It seemed to him to be an evil thing to have given way to the more or less popular outcry at the time for the remission of these dues. He did not, however, take the view which had been expressed by the Chairman—that the astute north countrymen would keep to themselves the whole benefit of the abolition of these dues. He did not see why the Chancellor of the Exchequer should not re-impose them; and he hoped that in some way that gentleman would see the observations which their Chairman had made on this point, and be bold enough to take the bull by the horns, and re-impose the duties, giving half of the benefit to the City and keeping the other half himself.

Mr. George Livesey remarked that it was "crying over spilt milk" to refer to the coal dues, which had gone, and which would never be re-imposed. Supposing, however, that they were re-imposed, what would be the result? They would all have to raise the price of gas by 1d. or 2d. per 1000 cubic feet; because, whatever might be said, whether or not the coal-owners had got the 1s. a ton which had been taken off—and he himself did not agree that they had—he believed that if the dues had not been taken off, they would have had to pay 1s. a ton more for their coals in some way or another. It was certain that if the dues were re-imposed the gas consumers would have to bear the burden. He did not think that Mr. Ennis had been correct in what he had stated respecting the dues. The City had 4d. and the Metropolitan Board of Works 8d.; he was not sure about the 1d. mentioned by Mr. Ennis. A large proportion of the 8d. went to pay for the embankment. It seemed to him altogether a mistake to impose a tax on coal, which really simply meant a tax on gas. He had himself strongly supported the abolition of the dues; and he took some credit to himself, and was rather proud of it, that he had had "a finger in the pie" in getting the dues abolished. He was sure that by this proceeding the consumer had had his gas reduced by 1d. per 1000 cubic feet. It was not, however, much use speaking about the matter, because the dues would certainly not be re-imposed. He congratulated the Directors on having come through a troublous half year as successfully as they had done. The rise in coal last year was owing to the strike in Wales, which caused an advance of 1s. a ton in the price. The Company had had to bear this burden, and had still come out with a surplus; and he therefore thought that the shareholders might congratulate themselves and the Directors on the success attained in the past half year.

The motion was then carried unanimously.

The Chairman afterwards proposed the payment of the dividends mentioned on the old and the new stock, in both cases less income tax, for the half year ended Dec. 31 last, the warrants for the same to be forwarded by post to the proprietors.

The Deputy-Chairman seconded the motion, which was carried unanimously. He afterwards proposed the re-election of the retiring Directors, Mr. Gill, Mr. Walter Hunter, and Mr. E. T. E. Besley, Q.C., whose respective qualifications as members of the Board he commented on.

Sir John Colomb, K.C.M.G., M.P., seconded the motion, which was carried unanimously.

The Chairman, on behalf of his colleagues and himself, thanked the shareholders for their kind reception of the resolution. Mr. Bradshaw had spoken of him personally in an extremely kind way; but he might state that if he had done any good at all since he had been with the Company, it was largely owing to the fact that he worked for many years with Mr. Bradshaw's father on the Board. It was 26 years ago since he first became a Director of the Company. He was glad to say that they were a thoroughly united Board—united with the object of promoting the prosperity of the Company, in which they were all greatly interested.

The retiring Auditor, Mr. John Haigh, was afterwards re-elected.

Mr. Gibbs then proposed a vote of thanks to the Chairman and Directors for their management of the Company's affairs, and for their courtesy. He desired, however, to make one or two remarks with respect to the issue of new stock last November. At the meeting held in October, Mr. Bradshaw, who seconded the resolution respecting the issue, stated that the Directors would postpone the issue as long as they could, because when the time came for issuing the stock, it would be an evil date for the Company, although a happy date for the stockholders. He (Mr. Gibbs) thought this statement was somewhat of a contradiction in terms, although he said nothing about it at the time, nor did any other shareholder. He had since felt that if he could elicit some explanation from the Directors, the point might be cleared up. He could not understand that what was good for the stockholders could be evil for the Company, as he regarded the interests of both as identical. Possibly, what the Deputy Chairman had in his mind in making the remark in question was the management and the staff. He (Mr. Gibbs) could well understand that increased capital would cause more work and more anxiety to the management and staff in order to produce the greater income that would be required. But he presumed that most of the capital raised was employed in extending the works and the area of lighting—thus producing more income; and if the business of the Company was a growing one, the stockholders would not object to some increase in the salaries. There was another little matter to which he desired to draw attention. Mr. Bradshaw in the same speech laid great stress on the point that the Directors had not so far made up their minds as to issuing the new stock; they had not fixed on any price for it, and he (Mr. Gibbs) understood that it was quite uncertain whether the stock would be issued in the then current six months. It was stated that the resolution was required in case the Directors might want to issue the stock; but in the very next month the stock was issued. Personally he had been very glad that this was so; but it seemed a sudden proceeding after what the Deputy-Chairman had said.

Mr. Livesey cordially seconded the resolution.

The Chairman, after warmly thanking the proprietors for their vote of thanks, stated that with regard to the remarks of Mr. Gibbs, Mr. Bradshaw had informed him (the Chairman) that it would be more convenient if after the meeting he saw Mr. Gibbs and explained the points referred to. With respect to the question of issuing the stock so soon after the last meeting, it was distinctly understood when the Directors entered the room six months ago that nothing at all was to be mentioned as to the date of issuing the stock; because they had not at that time made up their minds whether the issue should take place quickly or for some time to come. Certain circumstances occurred—it might have been the condition of the Money Market, for instance—which made them think that it would be expedient to issue the stock when they did. He was reminded that a month's notice must be given before stock could be issued. Continuing, he proposed a hearty vote of thanks to the Engineer, the Secretary, the Accountant, and the staff generally, in recognition of their services during the past six months. It was, he said, a great comfort to the Board to know that they had so good and able a man as Mr. Henry Jones to manage their affairs. They had the most implicit confidence in that gentleman, who, they were well aware, would do his utmost to promote the welfare of the Company. Mr. Jones had frequently had most anxious times in connection with coal and labour troubles; but he knew that he had the Board's entire support. Their able Secretary, too, was always ready to assist them in any way he could. He might state that the Company had not a very large staff, and therefore a good deal more work had fallen on the Secretary in the past six months on account of the issue of the new stock—a circumstance which they would understand better when he stated that they had now no fewer than 1500 proprietors. Their Accountant, Mr. Favatt, was absent; but they must certainly not forget one who had been working for the Company since he was a boy.

The Deputy-Chairman seconded the motion, which was carried unanimously,

The Engineer (Mr. H. E. Jones) and the Secretary acknowledged the vote, the latter gentleman remarking that this was the 40th half-yearly meeting at which he had been present to receive their thanks; and that during his 20 years' service he had not been absent from his post for a single day on account of ill-health.

The proceedings then terminated.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Half-Yearly General Meeting of this Company was held on the 31st ult.—Mr. Charles Lawler in the chair.

The Secretary (Mr. F. T. Cotton) having read the notice convening the meeting, the report and accounts for the six months ending Dec. 31 last, the principal features of which were dealt with in the "Journal" a fortnight ago, were presented.

The Chairman, in moving the adoption of the report, called the proprietors' attention to the fact that there had been an increase in the quantity of gas made and sold, for which there had been received £3022 more than in the latter half of the previous year. The greater portion of this increase was attributable to the additional number of gas cookers and heaters, prepayment meters, and gas-engines now in use. They had received for sulphate of ammonia £945 more than in the corresponding period of 1897. The tar market was still depressed; but they had obtained £325 more for it than before. The sale of coke had produced £658 more. But against these increases they had to pay £1634 more for a portion of their coals. At the last half-yearly meeting, he drew attention to the comparatively small number of gas cookers and heaters in use in Dublin, as compared with other cities and towns in the United Kingdom, although gas was higher in price in some of the places where these appliances were in use. Shortly after that time, the Company had a large number of applications for gas cookers and heaters. So numerous were they that the officers were unable to execute all the orders received for them. To remedy this, and prevent disappointment in future, the Board had taken premises in Grafton Street, and had entered into working arrangements with one of the largest gas heating and cooking stove manufacturers to carry on this part of the Company's business. From the high and well-known character of the firm, they had no doubt the work would be executed to the satisfaction of the purchasers. They had also made arrangements whereby gas consumers would be able to purchase incandescent burners and mantles on the same premises. There had been an increase in the unaccounted-for gas amounting to about 1¼ per cent., which had entailed a serious loss on the Company. This had been caused by the carrying out of different works—such as the main drainage, the electric lighting, and the telephone and tramway schemes—now in progress. The mains and service-pipes of the Company had been well laid, properly secured, and perfectly staunch; but during the execution of these works the contractors had interfered materially with the distributing plant of the Company, and by so doing had caused this great loss of gas. He need scarcely say this was immediately set right by the Company. Of course, in the future, other loss of the same kind would be

experienced; and they would take steps to obviate it. However, when all these works were completed, great benefit would be derived.

Mr. J. R. Wigham seconded the motion; and it was at once carried unanimously.

The dividends recommended—viz., at the rate of 10½ per cent. per annum on the old, and of 7½ per cent. per annum on the new shares—were then declared; the retiring Directors and Auditor were re-elected; and the proceedings closed with a cordial vote of thanks to the Chairman, Directors, and officers.

COLONIAL GAS UNDERTAKINGS.

We have lately received the reports and balance-sheets of several Colonial gas undertakings, and extract therefrom the following particulars:—

The accounts of the Brisbane Gas Company for the six months ending Dec. 31, 1898, show that the sale of gas, &c., produced a total of £21,039, which, added to the balance brought forward (£2268), made a sum of £23,307. The expenditure on manufacture, depreciation, &c., was £10,951; there was placed to the reserve £1000, and to the railway siding account £1500; interest came to £539; and the balance was £9317. The Directors, in their report, recommended a dividend of 5 per cent., which with the tax (£349) would absorb £7345, and leave £1972 to be carried forward. They announced a further reduction in the price of gas; the discount for prompt payment from Jan. 1 last being increased from 15 to 17½ per cent.—making the net price 5s. 6d. per 1000 cubic feet. A reduction has also been made in the rate for street lighting.

The North Shore (Sydney) Gas Company made a net profit of £3042 in the six months ending Dec. 31, 1898. Adding the balance of £42 brought forward, there was a sum of £3084 available for distribution at the half-yearly meeting. Out of this the Directors recommended the payment of a dividend of 3 per cent. for the six months, free of income-tax, amounting to £2700; the allocation of £211 for interest on borrowed money; and the payment of £100 to the officers' fidelity guarantee fund, and of £30 to the interest suspense account—making together £3041, and leaving £43 to be carried forward. The Company have entered into a contract for the street lighting of the Municipality of Lane Cove by gas for ten years from Jan. 1, 1900; and the necessary mains, &c., have been ordered. The Manager (Mr. T. O. Morland) reports that the Company's plant is in a very satisfactory condition.

The Maryborough (Queensland) Gas Company made a profit of £1058 in the latter half of last year; and after deducting therefrom the dividend tax, amounting to £38, there was a sum of £1020 available for distribution at the recent general meeting of the shareholders. The Directors recommended that this sum should be used in the payment of a dividend for the half year at the rate of 6 per cent. per annum, amounting to £771; the balance of £249 to be carried forward.

In their 52nd half-yearly report, the Directors of the Rockhampton (Queensland) Gas Company, Limited, express their pleasure at being able to state that the operations for the six months ending Dec. 31, 1898, in both the gas and electric light sections of the business, show an improvement; the anticipation expressed in the preceding half-year's report having been realized. The gas business shows a profit of £2112; the electrical undertaking, one of £286. The total profit (£2398) from the two sections of the business has been placed to the credit of the profit and loss account. After providing for interest on debentures, &c., and dividend duty, a credit balance of £1935 remained; and from this the Directors recommended, at the recent half-yearly meeting, the payment of a dividend at the rate of 7 per cent. per annum on the ordinary shares, and 9 per cent. per annum on the preference shares, amounting to £1683, free of dividend duty, and utilizing £230 of the balance to write off the cost of rebuilding and renovating one of the boilers in connection with the electricity department. For a considerable period the Directors have had under consideration an extension of plant in both gas and electric lighting sections, rendered necessary by increase of business; but they deferred taking definite steps until the Company obtained an Order in Council under the Electric Light and Power Act of 1896, which has at length received the sanction of the Governor in Council for the full term of 42 years. The Company's position in connection with the supply of electricity for Rockhampton and its suburbs being thus assured, the Directors have decided upon issuing debentures on the London market.

THE YEADON GAS QUESTION.

The Sliding-Scale and a Neutral Zone—Suggested Compromise.

At a Meeting of the Rawdon District Council last Wednesday, a resolution was passed to the effect that the Council were prepared, along with the other Councils concerned, to promote a Bill in Parliament for the purchase of the works of the Yeadon and Guiseley Gas Company. A similar resolution was also passed at a meeting of the Yeadon Council the same day; and a Committee was appointed to confer with the other authorities as to the wording of a "purchase clause" which it is intended to have, if possible, inserted in the Company's Bill when the opposition is continued before the House of Commons Committee.

The Clerks of the three Councils have since received a letter from Messrs. Watson, Son, and Smith, the Gas Company's Solicitors, containing overtures of a compromise. After stating that their clients were desirous, notwithstanding the extremely hostile attitude of the Councils, of coming to an amicable arrangement if it could possibly be done, the Solicitors went on to say that they were instructed to inform the Councils that the Company were willing to consent to the Bill being so altered as to provide that if the price charged by the Company is between 2s. 10d. and 3s. 6d., both inclusive, the standard rates of dividends are to be paid, and that the standard rates of dividends are to be decreased by 5s. per cent. in respect of every penny charged above 3s. 6d., and on the other hand increased by 5s. per cent. in respect of every penny charged below 2s. 10d. In order that there may be no misunderstanding this time as to the proposal, enclosed in the letter was a draft of the section which it was proposed should be inserted in place of section 4 of the Bill as passed by the House of Lords. They understood that the Council had decided to press the portions of their petition which dealt with the illuminating power and testing-station, which points were dropped at the conference in February. The Company had no objection to either of these points; but, as previouslypointed o ut, they would mean a considerable addition of expense, which would have to be paid by the consumers. They were instructed that such additional expense would be at least 2d. per 1000 cubic feet; and if the Councils were not prepared to abandon these points, the prices above mentioned would have to be raised from 3s. 6d. and 2s. 10d. to 3s. 8d. and 3s. The letter also stated that the Company were prepared, in deference to the feelings of the Councils, to abandon the electric-lighting clause of the Bill if an agreement were come to, and said the Company would be glad to hear at the earliest convenience whether they were prepared to agree to the proposed terms. The offer was without prejudice.

THE YEOVIL GAS-WORKS ARBITRATION.

The Umpire's Award.

The award made by Sir George B. Bruce, the Umpire in the arbitration proceedings relative to the purchase of the undertaking of the Yeovil Gas Company by the Yeovil Corporation (see *ante*, p. 385), was received at the Company's office last Thursday morning. After reciting the clauses of the Act under which the purchase is to be effected, the Umpire states: "I award and determine that, having regard to, and making allowance for, the capacity of the works and plant being in excess of the requirements of the Company, and sufficient to meet future requirements, the sum of £79,591 be paid by the Corporation to the Company." It may be remembered that the engineering witnesses for the Company (Messrs. Thomas Newbigging, Henry Woodall, jun., and Joseph Hepworth) put the value of the undertaking at about £96,000; those for the Corporation (Messrs. Charles Hunt and W. R. Chester) giving £54,000 as the figure. The award is therefore much nearer the sellers' estimate of the worth of their property than that of the buyers. According to the provisions of the Corporation Act, the Company take all cash balances, reserve fund, stock-in-trade and stores, and all rents, profits, and book debts at the time of transfer. The cost of obtaining the award, which covers the fees of the Umpire and the two Arbitrators (Messrs. Valon and Stevenson) only, is £520 14s. 6d., and which will have to be paid by the Corporation. In addition to this, there will be the other fees connected with the arbitration, which, with the costs previously incurred in passing the Bill through Parliament, incidental expenses, and the compensation to officers, will amount to about £10,000, which will bring up the total sum to be paid by the Corporation when they take over the works to nearly £90,000. The price they offered the Company during the preliminary negotiations was £48,000; but this offer was declined. The date agreed upon for the formal transfer of the works is the 30th of June.

LEEDS CORPORATION GAS UNDERTAKING.

Advance of Workers' Wages—Mains Extensions and Enlargements—£150,000 to be Borrowed.

Three matters of considerable importance in connection with the Leeds Corporation Gas Department were submitted to the City Council last Wednesday. The first had reference to the application of the gas workers for an advance of wages, the second to the proposed expenditure on the distribution system during the next five years, and the third to an application to the Local Government Board for their sanction to the borrowing of £150,000. A report of the Gas Committee on the first-named subject was noticed in last week's issue; and, briefly, their recommendations were: That an advance of 2d. per shift should be given to stokers, firemen, coal wheelers, coke wheelers, and the machine men, and elevator men at the New Wortley works, and 4d. per shift to the coal trimmers on horizontal work; and that the foremen and deputy foremen stokers at the Meadow Lane and the New Wortley works be given an advance of 2s. per week, and those at York Street 1s. per week. No alteration was proposed in the wages of the yardmen and purifiers; and the Committee declined to reduce the hours of pipelayers from 54 to 48 per week. This refusal gave rise to some opposition.

Alderman Lowden, the Chairman of the Gas Committee, in proposing the adoption of the minutes containing the recommendations as to the wages of the workmen, said that from time to time during the last few years the Committee had several applications from one class of workmen or another in the Gas Department. On these occasions the Committee had made concessions. In November, 1895, they made a concession which was equal to £900 a year; and in the January following, they made other concessions representing £4200 a year. The latest application for further advances of 4d. per shift for stokers, firemen, purifiers, coal wheelers, yardmen, and cinder throwers, and for an eight-hour day for pipelayers, would, if granted, be equivalent to £5500 per annum. The officials of the men's Union stated that they could name something like nineteen places where wages were higher than in Leeds; and they suggested five for the Committee to visit—Birmingham, Sheffield, Liverpool, Newcastle-on-Tyne, and South Shields. A Sub-Committee had visited these places; and he wished to emphasize the fact that these were the towns suggested by the men themselves. As far as Birmingham, Sheffield, and Liverpool were concerned, the information was given on the express condition that the Committee should treat it confidentially, and not make it public; but he could say that in these places, though the wages were higher than were paid in Leeds, yet, taking into consideration the amount of work done for the wages paid, the men at these works were considerably less favourably situated than were the Leeds men. With regard to Newcastle and South Shields—where the conditions were nearly the same—he would at once say that the wages and conditions of employment there were more favourable to the men than those prevailing in Leeds. But there were reasons for this. They found that at Newcastle unskilled labour was scarce, and in very great demand. Moreover, as there was not sufficient plant for the purification of gas at Newcastle, the purifiers had to work night and day; and in order to get the work done expeditiously, the Company were willing to pay a big wage. He did not know the relative prices of coal at Newcastle and Leeds; but a year ago, when he had occasion to

make inquiries, coal at Newcastle cost something like 2s. a ton less than in Leeds, which meant—assuming that the same quantity was carbonized in Newcastle as in Leeds—a difference of no less than £30,000 a year in favour of Newcastle. He was also told that at Newcastle only 15-candle power gas was produced; and this allowed of the use of an inferior class of coal. And whereas Newcastle was in the middle of the coal-fields, Leeds had to pay extra for carriage. For some of the statements made by the men in support of their application, the Committee could find no corroboration. One statement was that in other towns double wages were paid for Sunday work. The Committee did not find a single case in all the places visited in which double wages were paid for Sunday work. But of fourteen places in respect of which they got returns, while seven paid time-and-a-half for three shifts (as in Leeds) only one paid time-and-a-half for one shift, four paid time-and-a-half for two shifts, and two did not pay anything extra for Sunday work. In addition to the towns he had named, there were other places of which the Committee had particulars—Bradford, Bolton, Huddersfield, Halifax, Leicester, Nottingham, Oldham, and Salford. They found that Leeds workmen were more favourably situated than those at each of these places, with the exception of Oldham, where the men had better terms than in Leeds. But after all it was hardly fair to compare Leeds with places where the works were certainly not up to date, such as Oldham, Newcastle, and South Shields. He did not think he had made out a very strong case for an advance. But the Committee felt they had in the gas workers of Leeds a very intelligent and deserving lot of men; and though, taking wages and conditions and the nature of the work into consideration, Leeds compared very favourably with the great majority of places of similar magnitude in other parts of the country, the Committee felt that, bearing in mind that throughout the country generally there had been a rise in the rate of wages for almost every class of employment, it was only reasonable that they should recommend a small advance. At present, for an eight-hour day, the foreman stokers got 5s. a day, and time-and-a-half for Sunday work, which meant, when they worked on Sunday, a wage of 37s. 6d. This was not a bad wage for what they might fairly call unskilled labour—labour that required a considerable amount of physical energy, but only ordinary intelligence. The question of the pipelayers' application for an eight-hour day was an altogether different one. About the beginning of 1896 they had an advance equivalent to £1350 per annum. The grounds upon which they now asked for a reduction of their hours from 54 to 48 per week were that the nature of their occupation necessitated their having to work in all kinds of weather, that sometimes in cases of urgency they were liable to be called out at all hours of the night, and that occasionally they worked up to their knees, he believed, in tar and water. He had made inquiries and had found that the statements about being called out at all hours were somewhat exaggerated. The Superintendent of the department had ascertained that the calling out of the men in the night time averaged one night per month; and as to the statement that they had to work under uncomfortable conditions—up to their knees in tar and water—this did occur on one occasion, in connection with the laying of mains at the York Street works, but such a case might not occur again for 20 years. At no place that the Committee were aware of did pipelayers work only 48 hours per week. In the majority of instances they worked 54. At two places—Liverpool and Nottingham—they worked 55½ hours, at Salford and Bolton 54½, at Sheffield 54, at Newcastle and South Shields 53, at Huddersfield and Halifax 50½, and at Bradford 49½. He believed the Leeds pipelayers said it was not reasonable, bearing in mind that all other departments in connection with the gas-works had an eight-hour day, that they should be compelled to work nine. At times the men had to go considerable distances to their work. Probably in some cases this might take half-an-hour, and the same time in returning; and, if the working hours were reduced to eight, it would mean a very short working day. He did not see any reason why a Corporation servant should be paid more than a similar class of workmen employed in outdoor work, or why the Corporation should take the lead in adopting an eight-hour day for this class. In conclusion, Alderman Lowden said he wanted the Council to approach this subject in a spirit of consideration and justice to the workmen; and he also wished them to approach it in the same spirit with regard to the ratepayers. The Committee thought that their recommendations were sufficient to meet the case, at any rate for the present. Members of the Committee, with one exception, were perfectly unanimous in their recommendations.

Alderman W. Walker seconded the motion.

Mr. Connellan thought the Chairman had laid the matter very fairly before the Council, and had taken considerable pains to give information of the facts that had influenced the Committee. He, however, begged to move, as an amendment, to delete the word "not" from the paragraph: "That the application of the pipelayers for an eight-hour day be not acceded to." All the other departments, he said, were on the "eight-hour system;" and he did not see why the pipelayers should not be.

Mr. Marston seconded the amendment.

Mr. Ratcliffe said the men's leaders had displayed bad judgment in sending the Committee to visit places where the labour conditions were immensely worse than in Leeds. At no place did they find the conditions much better than at the Leeds Gas-Works. He fully supported the recommendations.

Mr. Kinder was in favour of the amendment, as was also Mr. R. Pickersgill, who, observing that he was "not afraid of the ratepayers," thought the Corporation might "go the whole hog."

Alderman Lowden said he could not admit that the pipelayers' duties were such as to call for an eight-hour day.

Only a few members voted for the amendment; and the resolution was therefore agreed to.

Alderman Lowden next moved: "That the Council authorize the Gas Committee to carry out extensions and enlargements of mains within the city, during the ensuing five years, at an estimated cost of £111,680." To show the necessity for this expenditure, he mentioned a few typical cases. First of all, he said, a very large portion of the sum—viz., £65,000—was required for extensions in the ordinary way during the next five years. In Domestic Street, there was a 4-inch main supplying 39 mains from 2 to 4 inches in diameter. Here, in the past, there had been no consideration as to whether the trunk main would be sufficiently large to supply subsidiary mains. In Stanningley Road, too, a 6-inch main, after supplying 500 ordinary services, had also to supply four 3-inch mains, one 4-inch main, two 6-inch mains, and one 2-inch main; and it was obvious this was an impossibility. In Wellington Road there was a 20-inch main to supply three 14-inch mains, one 6-inch, one 12-inch, and one 10-inch main; while the 14-inch main in York Street was diminished to 10 inches in Carver Street, and this had to supply two other 10-inch mains, two 8-inch mains, and a 4-inch and 6-inch main. This, he thought, would show that the complaints as to the character of the gas in recent years were not due to the quality but to the quantity, which people could not obtain. The object of the extensions was to enable consumers to get sufficient gas. If the expenditure was sanctioned, the complaints would cease, because the city would then be adequately served. The Corporation would, he submitted, be able to recoup themselves for the outlay by the increase in the sales.

Mr. Wilson seconded the motion; and it was agreed to without discussion.

Alderman Lowden next proposed that application be made to the Local Government Board for sanction to borrow £150,000. For the gas-mains, he intimated, at least £100,000 would be required; £25,000 would be wanted for gas-meters during the next five years, at the present rate of increasing population and demand for gas; and £25,000 was needed in connection with improvements at the York Street works. The last-named, he said, would have to be undertaken during the present year; and there was a feeling on the Committee that either mechanical stoking or inclined retorts would have to be adopted. It had been suggested that instead of spending money on York Street the Committee should provide works on another site sufficient to supply Leeds for many years to come. There was, however, no necessity at present to entertain such an idea. Provision was now made for 18 million cubic feet of gas per day, and the maximum consumption was 15 million feet; so that there was a considerable margin to work upon. Moreover, it did not follow that within the next few years the Committee would not be able to find means of furnishing a full supply. They had room at Meadow Lane for the installation of carburetted water-gas plant if necessary. Inquiries had been made for a suitable site for new works; but he would not like any indication to be given of where their eyes were directed. When the proper time came, the result of the inquiries would be made known.

Mr. Wilson seconded the motion.

Mr. Howgate moved an amendment to refer the matter back, in order to reduce the expenditure by the amount which it was proposed to spend on the York Street works. He objected, he said, to the rehabilitation of these works, generally on the ground that there would be no room for extensions; and he would like to see them removed to another site.

Mr. Batley considered that the York Street works were the most profitable in Leeds.

The amendment was not seconded, and therefore fell to the ground.

Alderman Lowden remarked that the city could not do without the York Street works. It was absolutely necessary there should be some expenditure in the direction proposed. In view of changes which might take place in the manufacture of gas, it would be unwise to extend the works at present.

The motion was adopted.

The men employed at the Leeds Gas-Works assembled in considerable numbers last Sunday to consider whether or not the advance of wages offered by the Gas Committee should be accepted. In the course of the discussion, reference was made to the speeches in the Council Chamber on Wednesday; and a denial was given to the statement that the leaders of the men had requested the Committee to visit certain towns. The men's version was that, at the conference with Alderman Lowden and his colleagues, they mentioned that there were a number of towns (including those subsequently visited) which paid better wages than Leeds, but that they did not ask the Committee to go there. Eventually, the men adopted a resolution accepting the advance offered, but recording their opinion that "the application ought to have been granted in its entirety, seeing the reasonable nature of it." They further held that the eight-hour day for the pipe layers should have been conceded, "owing to the very irksome nature of the duties;" and those present pledged themselves to assist this section, along with the District Executive, in any action they might take to secure the desired end. The District Secretary of the Gas Workers' Union intends asking the Committee to reconsider the matter.

THE IRREGULARITIES AT THE BURY GAS-WORKS.

A Colliery Company Pay £2000.

At the Meeting of the Bury Town Council last Thursday, Mr. Byrom, in seconding the confirmation of the proceedings of the General Purposes Committee, entered into a lengthy explanation as to the action taken with reference to certain irregularities which had been discovered in connection with the coal supplied to the gas-works. In the course of his remarks, he said that members of the Council would recollect that it was now some eighteen months since the irregularities took place. They were investigated by a Special Committee; and, after careful consideration, it was decided to commence a civil action against the persons ascertained to have been implicated. This was because they were advised by Counsel that they could not sustain a criminal action against the parties concerned. The civil action had been going on for something like twelve months; but a settlement had been arrived at which he thought would be satisfactory to the Council. The irregularities were clearly proved; and the Directors of the Hindley Field Colliery Company had admitted that breaches of their contracts had been made—an inferior class of coal being supplied, although the full price was charged. The figures had been gone into, and the amount had been ascertained to be a very considerable one—altogether something like £1700. This represented the difference in value and quality between the coal delivered and that contracted for. But the Corporation had other claims against the Company, and put in one for £5000, for breach of contract, damages, and variations in price. The action led to a vast amount of difficulty; but eventually the Directors of the Company named were satisfied that their servants were responsible for these irregularities. They, however, denied all knowledge of them personally. The Directors expressed themselves willing to meet the Corporation, and made an offer of £2000—which meant £500 each to the four Directors—

with costs up to date. Having carefully considered the whole circumstances, the Gas Committee and the General Purposes Committee decided to accept the offer made, because to have gone to arbitration would have involved great loss of time, and much difficulty in sustaining the claim to £5000. If the Council endorsed the action of the two Committees, they would be £2000 in hand, and all costs paid. The proceed ings were confirmed without discussion.

The following is the record of the action of the General Purposes Committee on the matter: "Meeting held on April 5—the Mayor (Alderman Wike) in the chair. Mr. Byrom moved, and Mr. Collinge seconded, a motion that the minutes of the special meeting of the Gas Committee, held on the 27th ult., recommending the acceptance of an offer made by Messrs. Darlington and Sons, Solicitors to the Hindley Field Coal Company, Limited, for the settlement of the action against the said Company and others, be approved and recommended to the Council for adoption. An amendment was moved by the Mayor, and seconded by Mr. Holt, to the effect that the minutes be not approved, but that the offer be declined, and the action proceeded with. Eleven members voted for the amendment; and twenty against. The original motion was then put and carried."

THE BOLTON CORPORATION AND THEIR TAR TENDERS.

Local v. Outside Firms.

At the Meeting of the Bolton Town Council last Wednesday, a long discussion took place in regard to the action of the Gas Committee in their acceptance of tenders for the tar made at the works during the next twelve months. At a special meeting of the Committee, held in the early part of the past month, the contracts were opened, and that of Messrs. J. Turner and Co., of Queensferry, being the highest in price, was accepted. It subsequently transpired that their price was 1d. per ton more than was offered by the Burnden Tar Company, of Bolton; and some feeling was engendered on the question. At another meeting of the Committee, held later on, the first resolution was rescinded; and it was resolved that the Burnden Tar Company be offered half of the tar, and the remaining half be offered to Messrs. Turner and Co., "at the prices stated in their respective tenders, less the 10 per cent. in each case reserved for local customers." At the Council meeting, Alderman Tong moved that the matter be referred back to the Committee; saying it was possible, from what he had heard, that the effect of these resolutions dividing the contracts might be to cause confusion, and be detrimental to the interests of the Department. This motion was seconded by Alderman Rutter, and accepted as a friendly amendment by Alderman Miles, the Chairman of the Gas Committee. The latter said it would be exceedingly unwise to discuss the matter in public; and he asked the Council not to go into it that day. Mr. Tootill, a member of the Gas Committee, and other gentlemen present, declined to accept Alderman Miles's suggestion; and then a long discussion resulted. On a division, the amendment was carried by 49 votes to 26. Mr. Tootill moved a further amendment to the effect that it be an instruction to the Committee to advertise for fresh tenders; and another discussion took place, during which it was insinuated that some one had been in communication with Messrs. Turner a short time before the special meeting of the Committee was held to consider the tar tenders. The Chairman was asked if he knew who it was; but Alderman Miles declined to deal with the general observations which had been made. He said the matter had been referred back to the Committee, and he hoped the Council had confidence in them. He was bound, however, to take notice of certain offensive remarks which had been made. He spoke as Chairman of the Gas Committee, and he was not going to lose one whit of what attached to the position and the authority of the office. The part he had taken in this matter as Chairman was a perfectly honourable one; and he defied anybody, either in the Council or outside, to prove otherwise. If the tender of the local firm had been 1d. more, they would have had the contract at once without a single word. The amendment was lost by 43 votes to 21; and the first amendment was then put as the original motion and carried. This means that the whole matter is referred back to the Committee, without any restriction whatever. It is stated that the tenders varied in price from 18s. up to 27s. 7d. per ton. Messrs. Turner offered the 27s. 7d., and the Burnden Tar Company 27s. 6d.

ELECTRIC LIGHTING NOTES.

The Reigate Town Council have decided to apply to the Local Government Board for their sanction to the borrowing of £25,000 for electric lighting works.

The Eastbourne Electric Light Company have resolved to accept an offer of the Town Council to purchase the undertaking for £83,000—being £2 for every £1 of capital subscribed. The purchase is to be completed by Jan. 1 next.

The Hereford Town Council have adopted a recommendation of the Electric Lighting Committee, that tenders be accepted for the erection of the electricity station buildings at £2752, and for ironwork at £395. It is stated that there is every hope of the work being so far completed as to be able to light the city by electricity early in October.

At their last meeting before the Easter Holidays, the Gas Committee of the Oldham Corporation considered plans and estimates prepared by Professor Kennedy for additions to the electricity works, the alteration of the whole of the mains to the three-wire system, and the extension of the mains into other districts. The cost of the alterations and additions is estimated for the purpose of the application to the Local Government Board at £17,800.

At the meeting of the Hampstead Vestry last Thursday, Mr. Adams complained of the "pitiful light from the arc lamps throughout the parish." The lighting, he declared, was "simply shameful;" some of the arc lamps not being more than 10-candle power. As this state of things had been going on for a long while, it was quite time some improvement was made. The Chief Engineer deprecated these statements; while Mr. Hall, the Chairman of the Lighting Committee, maintained that the Hampstead arc lamps compared favourably with those of other parishes. After the Chairman of the meeting had suggested a more specified complaint, the matter dropped.

The citizens of Worcester had an unusual Bank Holiday excitement on Monday night last week; the electric light failing for about a quarter of an hour. A good deal of consternation was caused by the mishap. People rushed out of hotels and public-houses in considerable alarm, servants ran hither and thither in search of candles and lamps, and some had to borrow from neighbours before they could provide any form of illumination. The entrance to the Star Hotel was "decorated" with a couple of candles till the light could be switched on again. Mr. Sutherland, the Engineer, explains, according to the "Worcester Chronicle," that an insulation of a connection of one of the dynamos broke down, cutting the machine out of circuit, and blowing out the fuses of the one running at the time. Two other machines were put on as soon as possible.

A local inquiry was held at Hereford last Friday, by Colonel Durnford, R.E., with reference to an application by the Hereford Corporation to borrow £20,000 for electric lighting. The City Surveyor (Mr. J. Parker) stated that the Corporation obtained in 1898 a Provisional Order which required them within a period of two years to lay down suitable and sufficient plant and distributing mains for the purpose of supplying electricity in the compulsory area—viz., High Town; but they proposed at once to make provision for lighting also other parts of the city. The three-wire low-pressure distribution system, worked in conjunction with accumulators, with feeders, was the most suitable one for Hereford, supplying current at a voltage of 440 to 500 between the two outer mains, or between the outer and middle mains of 220 to 250; giving the consumers a pressure of 220 volts. The site for a generating station had been procured at a cost of £1650. The estimated cost of the installation was £19,976. Evidence in support of the application was given by the Mayor (Mr. F. R. James), the Chairman of the Gas Committee (Alderman Carver), and others.

The Engineer of the Hull electric lighting undertaking had to report to his Committee last Wednesday upon two failures of the supply in the preceding week. One of them, which affected the new town only, occurred at 1.40 a.m. on Thursday, the 30th ult., and was caused by a short-circuit on the mains in Park Street. This fault occurred at the same point as on a previous occasion; and the Engineer could only attribute it to bad workmanship on the part of the contractors. The second failure occurred at the same hour on the morning of Saturday, the 1st inst., when a short-circuit took place across the outer mains of the old town three-wire system. Those consumers who take their supply from the outer mains were without current till about 6.30 a.m., when the fault was cleared; but, so far as the Engineer was aware, the only consumer inconvenienced was the "Eastern Morning News" office. The first cause of the short-circuit appeared to have been the too sudden switching on of their large motor, which had the effect of reversing one of the 110-volt dynamos then running. The Engineer was confident that no repetition of the occurrence need be anticipated.

"The electric arc lamps at Bath," says the "Bristol Times," "are a source of trouble to the public and the authorities. Here is what the Chairman of the Bath Electrical Committee has said about them: 'The lamps made such a noise that it was impossible to endure them any longer. People in his house could not sleep; and he had had the lamp outside his place turned off at night.' Presumably the lamps behave themselves in the daytime. It appears that the lamps are very human in their conduct. You never know what they will do. Sometimes they hum like a thrashing-machine, and sometimes they will hiss like a disgusted audience at a theatre. One lamp at the top of Bridge Street is a model of quiet and seemly conduct. Why cannot the others be quiet too? The Chairman of the Committee has been very badly treated in the matter. He thought he was listening to a gramophone; and it turned out to be the street-lamp. Then people ring him up on the telephone, and threaten to leave Bath if the lamps cannot be kept in better control. In view of the possible depopulation of the city, steps are to be taken to secure lamps that shall be content to shine only. Lamps that think they are also musical instruments are not appreciated in Bath."

On the proceedings of the Electric Lighting Committee coming up for confirmation at the meeting of the Liverpool City Council on Thursday, Mr. Crean, alluding to the accounts, commented upon the large proportion of the profits taken in building up a reserve fund. He contended that the interests of the ratepayers were being subordinated to those of the consumers. The net income during two years had been slightly under £84,000, of which no less than 70 per cent. had gone towards establishing the reserve fund, and the magnificent sum of £1000 had been handed over to the Finance Committee in reduction of the rates. Mr. Petrie said it must not be forgetten that the Corporation paid something like £150,000 of goodwill to the old Company for the undertaking; and he thought in most companies the goodwill was written off year by year, and a certain sum was set aside annually for the purpose. The general ratepayers were getting an advantage from the undertaking through the street lighting and so forth; and the policy of the Committee was to bring the cost of electricity down into closer competition with gas, and to secure a larger number of consumers. There was no doubt, also, that they were liable from time to time to certain accidents in connection with the works; and unless they had a reserve fund and a renewal fund, their position was not safe. If they gave away all their profits and surplus in relief of rates, the Council would not very much care for him to come and ask for £30,000 or £40,000 for damage done by accident. They ought also to have some money in hand in order to keep themselves up to date with improvements. The minutes, which included the new scale of charges for electricity mentioned in a "Note" on the 28th ult., were adopted.

Water-Gas Plant for the Barrow Gas-Works.—The Gas and Water Committee of the Barrow Town Council lately recommended that, as the quantity of gas required is increasing very rapidly, designs and estimates be obtained for a carburetted water-gas plant equal to the production of 300,000 cubic feet daily. The recommendation has been adopted by the Council. It is remarkable that, though the Corporation have recently introduced the electric light, and something like 6000 lights have been applied for, the consumption of gas has since shown the great increase which necessitated the recommendation.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

I must give first place this week to the Informal Meeting of Gas Managers, which was held in Glasgow on Wednesday. It was the sixteenth meeting of the kind, and the eighth which I have attended. I can safely say that in point of the number of gas managers present, and of those who took part in the proceedings, as well as of the quality of the speaking, it was the best gathering of all the Informal Meetings at which I have been. At such a meeting, the bringing forward of technical subjects is not aimed at. The purpose is to give an opportunity for a friendly chat over the experiences of the past winter, so that managers who may have had difficulties may learn how to overcome them, or, if they are proposing extensions, may receive hints which will enable them to avoid pitfalls. How well the meeting performed its function, may be ascertained by a perusal of the report of the proceedings given in another column. Without reserve, manager after manager narrated his special trials and his victories, until it might almost be said that the ideal condition had been attained where everyone in the company had either to sing a song or tell a story. It would be too much to assume that this was altogether spontaneous. That it was largely so, is undoubted; but it cannot be overlooked that the address of the Chairman (Mr. W. Ewing, of Hamilton) was one which was eminently fitted to draw forth observations, and that the generalship of the Convener (Mr. A. Yuill, of Alloa) was of a high order. The presence of the Committee of the North British Association is an indication of the drawing together of the two meetings, and leads to the belief that ere long the Informal Meeting will be placed upon a more permanent footing. It cannot, of course, be suggested that the Informal Meeting has at all suffered from the want of an organized centre. Under the guidance of Mr. M'Gilchrist, of Dumbarton, who was for long the Convener of the gathering, it grew in interest year by year; and in the hands of Mr. Yuill, his successor, the interest seems still growing. There is an arrangement about the meeting which is very charming to those who attend it—that is, the entire absence of the reading of minutes and the presenting of reports. The actual business of the meeting is taken up at once. That is, as I say, very pleasant to those who attend; but, on reflection, I rather incline to the belief that some record of the proceedings would be desirable. We have seen how the origin of Gas Associations, a movement begun so late as 1861, is already almost lost. The feeling exists that one would like to be certain of what took place in those days; but there is nothing to go upon except tradition. In the case of the Informal Meeting, there are no records except those which appear in the public prints. It would be an easy matter for the Convener to keep a book, into which he could copy the names of the managers attending, and those who took any part in the proceedings, and the subjects dealt with. Such a minute need not be read—and, indeed, could scarcely be, seeing that there is no continuing body; but it could be kept by the Convener, and be handed by him to his successor. By this means, valuable testimony would be preserved regarding the activity or otherwise of present-day managers. The labour would be small, and the advantage might be considerable.

I have been led into this train of thought by a remark which was made by Mr. W. B. M'Lusky, of Selkirk, the Secretary of the Waverley Association of Gas Managers, when responding, at the dinner, to the toast of "Kindred Associations." Speaking to the circumstance that it had been established that the Waverley Association was the first of all Gas Associations, he said that the North British Association should now place the name of Mr. Clazy, of Kelso, at the head of their list of Past-Presidents, and give the date as 1861. I think there is a little indistinctness here. Mr. Clazy certainly was the first President of the Waverley Association; but it does not follow that he should be adopted by the North British Association. The Waverley has always maintained a separate existence from the North British. In the statement prepared by the late Mr. Robson, of Selkirk (published in these "Notes" on April 13, 1897), it is stated that the Fife, Kinross, &c., Association was formed in January, 1862, at a meeting in Cupar; and that the Scottish Association was formed at a meeting in Edinburgh, in April, 1862. Mr. John Lowden, of Leven, Fife, was the first President of the Fife, &c., Association; and Mr. Clazy, of the Scottish Association. The North British Association arose afterwards; and therefore the claim to have Mr. Clazy's name placed upon the list of Past-Presidents of it, must depend upon the determination of the question whether the North British is the successor of the Fife or of the Scottish Association. I have not the means of saying which, and so have no opinion as to the rightfulness of Mr. M'Lusky's request. The matter will doubtless be now looked into; and seeing that the request was made in a friendly spirit, it may be expected to be considered in the same manner. It is nobody's interest to exclude that which may be found to be the truth.

A deputation from the Dundee Gas Commission, or the Works Committee of it, have been in Glasgow this week, consulting with Mr. Foulis as to the ground plan for the re-arrangement of the gas-works. Mr. Foulis is strong upon the point of the construction of gas-works so as to lend themselves to the carrying out of extensions when the necessity for them arises. All his own works are perfect poems in this respect. He is of opinion that the gas-works in Dundee have not been designed with this object sufficiently in view. He showed the deputation how he would apply his idea to their works. He would construct a new gasholder, of 3 million cubic feet capacity, on the ground newly acquired; and he would have an overhead railway made alongside a retort-bench—leaving sufficient room for the introduction of mechanical stoking, if it should be adopted. This would be a first instalment. Then, in course of time, he would do away with existing gasholders, which would give room for another bench of retorts similarly equipped; and so on. The work of reconstruction would be undertaken as it should be required, and gas making would never be interrupted. The deputation saw the beauty of the idea; and they returned to Dundee satisfied that they had now taken a decided step forward in their reconstruction work—a work in which, as I have observed before, they have dragged most wearily along.

The Gas Committee of the Dundee Town Council yesterday opened tenders for the supply of cannel and other coal to the gas-works for the next twelve months. They require to be earlier in the market than most gas-works owners, because their financial year begins on May 1. Their requirement is about 55,000 tons. Evidently coalowners are under the impression that there is a possibility, if not a strong probability, that coal will by-and-bye be dearer than it is now; for the tenders are said to have been from 2s. to 2s. 6d. per ton higher than they were a year ago. There is nothing in the present state of the market to warrant such a rise. The miners have received 3d. per day increase; and there are very few pits in which a miner does not hew 3 tons of coal per day, which would represent 1d. per ton extra cost in winning. The laying on of from 8d. to 10d. per ton, to the consumer, is therefore clearly a precaution against future contingencies. The tenders received by the Dundee Committee were remitted to a Sub-Committee to tabulate and report upon. Is not this a favourable opportunity for the adoption of a sliding-scale in the price of coal? Let the prices under current contracts be slightly raised during the four months in which the miners' arrangement is to last, with continuation till the end of the year should no change be then made; but, in the event of miners' wages being then further raised, let there be a proportional rise in the price of coal—so much per ton per penny of advance. Such a scheme would ensure both the coalowner and the gas maker against inflated prices. It is true it might help the miners in pressing for a further advance in August; but there are two matters which would check their making any exorbitant demands—the one that this arrangement would give a solidity to the market which they would find it difficult to disturb, and the other that before August large stocks could be laid in at gas-works. But these are matters of detail.

Since I wrote my last budget of "Notes," an important development has taken place in the matter of the preparation of plans for the erection of new gas-works for the Corporation of Perth. I give the following report of it, which appeared in the "Dundee Advertiser" of last Saturday: Last night a special meeting of the Perth Gas Commission was held—Lord Provost Dewar presiding—for the purpose of considering the resolution come to in Committee, by a majority of 13 votes to 8, to appoint Mr. Gillespie, of Glasgow, as an independent Engineer in connection with the erection of the new gas-works, at a commission of 2½ per cent. on the amount of the contract still to be executed; this commission to include the salary of an Inspector of Works. Lord Provost Dewar, seconded by ex-Bailie Cuthbert, the Convener of the Gas-Works Committee, formally moved the approval of this decision. Councillor Keillor, seconded by Councillor Donnelly, moved an amendment that Mr. Wilson be allowed to complete the plans, and that an Inspector of Works be appointed to act under him. These gentlemen, in their remarks, contended that Mr. Wilson had not been dealt fairly with; and generally they placed the blame of the delay in the completion of the works on the shoulders of the Gas Committee—pointing out how from time to time the Committee had disapproved of plans put forward by their Manager. Councillor Keillor also reminded the members that they had two resignations of officials; and this, he thought, would also account to some extent for the delay. Both gentlemen, in the course of their remarks, were subjected to considerable interruption, and were frequently called to order as departing from the question before the Commission. Ex-Bailie Macgregor thought that the motion put forward by the Lord Provost was rather hard in its terms, and that it did not recognize in any degree the long and arduous labours of the ex-Manager. He therefore moved an amendment in the following terms: "That the Commission express approval of the amended plans hitherto produced by Mr. Wilson, in so far as these had been completed for the purpose of measurement, and recognize the labour and ability he had shown in the matter; but in respect that there had been much delay in the fulfilment of the work, and that Mr. Wilson's regular duties as Manager precluded his devoting the attention necessary for the special task involved in these plans, the Commission, under the advice of the Consulting Engineer, resolve in terms of the resolution of the Committee to appoint Mr. Gillespie, Engineer, of Glasgow, to complete the plans and specifications still required for the new gas-works, for a fee of 2½ per cent. on the total cost of the works so far as remain to be done, and that it be now placed in his hands." Councillor Hardie seconded. Bailie Wright held that a mistake had been made at the very start in not appointing Mr. Easson Manager; and in the present circumstances he did not see why they should saddle the Commission with another £1000, as was proposed—for the fees would amount to this. They should simply tell Mr. Wilson to proceed with the work without further delay. The Bailie incidentally mentioned that at Mr. Wilson's appointment they had expected too much of him. After some discussion, Lord Provost Dewar, in replying to the debate, remarked on Mr. Gillespie's experience and ability, and said that the approval of the motion would mean more chance of finality. He also pointed out that Mr. Gillespie appointed his own Clerk of Works, which meant £300, or an actual cost of £700—not out of the common—and not £1000 as some thought; and that the money would be well spent, considering that it would endow the Commission and the public with much more confidence. In answer to Mr. Barlas, the Lord Provost said that Mr. Foulis, who recommended Mr. Gillespie, would remain as Consulting Engineer. On a division being taken, ex-Bailie Macgregor's amendment was carried by 8 votes against 6, but was defeated by 8 votes to 12 when put against the Lord Provost's motion. Mr. Gillespie was accordingly appointed independent Engineer on the terms embraced in the motion.

I have inclined all along to the belief—and have frequently so expressed myself—that the blame for the deadlock which has occurred lay upon the Works Committee, and not upon Mr. Wilson; and I rather think that Bailie Wright gave confirmation of this view, in his remark that he considered a mistake was made at the start in not appointing Mr. Easson Manager. Bailie Wright was the Convener of the Works Committee then; and Mr. Easson was Assistant-Manager. It will be remembered that Bailie Wright was the gentleman who advocated the planting of the new gas-works upon a sandy island in the middle of the River Tay. He failed in this extraordinary scheme; and he did not get Mr. Easson appointed. There has, therefore, been a divided Committee. But I make up my mind, not altogether upon what has happened within the past two or three years, but upon what took place when the Perth Gas Commission were considering their last large extension of the gas-works, which was carried out under their Act of 1888. Those whose memories are good will recollect—and any who have a file of the "Journal," and who may turn to the doings of that day, will find out—how Mr. Whimster was pestered and obstructed by the Commissioners of the time. It is, therefore, no new thing for the Perth Gas Commissioners to look a very long time before they leap.

At the meeting of the Hamilton Town Council on Thursday, the Gas

Committee recommended the erection of a sulphate plant, which, it was said, could be done at a cost of about £800. The report by the Manager (Mr. W. Ewing) showed that an annual saving might be expected of about £723. Of this, £300 represented the saving which would be effected upon carriage alone. Treasurer Keith moved that the recommendation be taken back by the Committee. A saving of £723 a year effected upon an outlay of £800 was so overwhelming that no business man, if it were true, would be justified in opposing it. Treasurer Keith, however, disputed that the yield estimated—1 ton 14 cwt. of sulphate per 100 tons of coal carbonized—would be realized; and he quoted figures to show that it was not secured in other works. He brought out a saving of only £305 a year. He also contended that the comparisons of prices were not equitably taken, as the sum realized for tar and liquor was named at the lowest, and was put against the highest price recently received for sulphate of ammonia. He thought they should have more time to go into the figures. Other members feared that there might be difficulty if they were to discharge spent liquor into the public sewers. The Chairman characterized Treasurer Keith's statements as being largely assumptious, but expressed his willingness to take the subject back, as the Committee were confident of their position. A special meeting of the Gas Committee is to be held to consider the subject.

In the Dean of Guild Court at Motherwell, on Monday, the Motherwell Gas Company submitted plans for the construction of works for dealing with residual products. The Company have abandoned a proposal to erect the works on ground adjoining their feu, and now proposed to place them inside their own enclosure. Objections were taken on the ground of title by a representative of the proprietor of the estate upon which the feu is situated, and by the Burgh Engineer on the ground that no drainage system was shown. On behalf of the Gas Company, it was contended that they had a sufficient title to erect such works; and it was stated that the works, when built, would be under the control of the Inspector under the Alkali Act, who would not allow them to be conducted so as to constitute a nuisance. No drainage, it was stated, would be required, as the whole of the liquor would be used up inside. The Court delayed consideration of the plans for a fortnight.

Two young men belonging to Lochgelly, in Fifeshire, narrowly escaped death by gas poisoning in a temperance hotel in Brunswick Street, Glasgow, on the night between Saturday, the 1st, and Sunday, the 2nd inst. They engaged one bedroom between them, to which they retired about 11 p.m. on Saturday. Next morning they did not appear, and, about noon, heavy breathing having been heard inside the room, the door was forced. Both men were in bed in an unconscious condition. There was a strong smell of gas in the room, due, it was found, to a gas-tap without a stop having been turned too far. The men recovered consciousness several hours after their rescue.

It was reported to the Dumfries Gas Commission last Thursday that there had been an increased output of gas, as compared with the year 1897-8, of 6¾ million cubic feet, which was attributed to the fact that there are 610 grillers in use in the town. The Commission had before them a report by Mr. G. Malam, the Manager, upon the rearrangement of the hours in the gas-works, with a view to the reduction of Sunday labour. It was quite gratifying to find the stokers submitting a petition to have the hours which had been arranged between them and Mr. Malam continued during six months of the year, and that they should return to the old method for the other six months. Mr. Malam said that at present only half of the quantity of work was being done on Sundays that there was under the former method of working, and that a further reduction of hours might be made during the summer months. The proposed arrangement was agreed to. According to the scheme, two stokers get six hours' relief on Saturdays, and those who do not get this have a full day off on Sunday, which gives them a rest of 36 hours.

Aberdeen gas is not often called in question. This week, however, at a meeting of the Town Council, Mr. Cooper, a pronounced Socialist, put a question as to its quality. He is interested in the working-class district of Woodside; and, quite characteristically, his question was whether the gas in Woodside was as good as that supplied in the West-end, at such places, for instance, as the residence of Bailie Lyon. Mr. Johnston, the Convener of the Gas Committee, assured them—the only thing he could do—that the gas supplied at both places, and in the Town House as well, was the same. Bailie Lyon, hearing his name mentioned, got up and said that since he had called attention to the quality of the gas in the West-end it had improved very much. He thought the best way to overcome bad gas was to take in the electric light. The Bailie's latter remark is an absurdity. As to the first part of his statement, well, it reveals his possession of a power which, I suppose, no one suspected lay in him. It is not said that anything was done to improve the gas, except that he called attention to its quality. I am confident that Mr. Smith, the Gas Engineer, did nothing to improve it; but there was the improvement, all the same, or, at least, we have the Bailie's word that there was. It is wonderful.

Sales of Shares.—Messrs. Rowe and Corlyon recently sold at Falmouth sufficient 6 per cent. preference stock in the Falmouth Gas Company to produce £5000, at £15 to £15 15s. per £10 lot. This brings the capital of the Company up to £18,500, the total amount authorized. A small number of £10 "A" and "B" shares in the Eastbourne Gas Company were lately disposed of at a sale at Brighton; the "A" shares realizing £36 5s. each, and the "B" shares £27 5s. and £27 7s. 6d.

A Defective Gas-Tap again Accused of Causing Death.—Last Friday, the Manchester City Coroner held an inquiry into the circumstances attending the death of Henry Sutton, a barman at the Merchants' Hotel, Oldham Street, Manchester. On the night of March 1 Sutton went to bed in his usual health and spirits. He failed to appear next morning; and suspicion being aroused the bedroom door was broken open. There was a suffocating smell of gas in the room; and Sutton was found lying on the bed apparently dead. Medical assistance was sought; and eventually the man was taken to the infirmary. He recovered consciousness after two days; but pneumonia supervened, and he died on Wednesday last. It was stated in the course of the inquiry that the gas-tap in the bedroom turned completely round; but it was not otherwise defective. Neither on his admission to the infirmary nor after death were there any signs of suffocation by gas, though in the opinion of the medical officer gas had had something to do with the cause of death. The Jury found that the deceased was accidentally suffocated.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 8.

Sulphate of Ammonia.—Speculative requirements for March delivery having been covered, and holidays having intervened, the market assumed a quieter tone; and the closing quotations are £10 17s. 6d. to £11 per ton, delivered f.o.b. at the ports. Second-hand parcels have been put on the market in London and in Scotland at a discount on current prices, with the object apparently of depressing values. But, everything available having been absorbed at the end of March (exports January to March exceeding those for the same period last year by some 1300 tons), and a large portion of the April production being already sold, makers have been comfortable; and the quantity offered by first hands has been in very small compass. Home demand has been satisfactory; and there has been good inquiry from abroad for April delivery, though buyers' ideas of value have prevented large business. The forward position has not attracted much attention, although producers would make some concession upon prices quoted a week ago.

Nitrate of Soda prices are a shade easier, owing to further arrivals; and the closing spot quotation for fine quality is 8s. 6d. per cwt. Deliveries continue to be heavy both in the United Kingdom and on the Continent.

LONDON, *April* 8.

Tar Products.—Pitch is much inquired for, and its improved value is maintained. There is urgency in some quarters for delivery, pointing to fuel makers being short of the article. It may be found that the season's production has been disappointing in quantity. The shipping season for pitch is rapidly closing; and spot parcels command a ready sale. There is no improvement in benzol; and 90's are difficult to place at any price. There are buyers of 50's; but the prices mentioned are so low that few makers will accept. They rather prefer to make other uses of the heavier benzols. Creosote and tar oils are firm, with good inquiry for summer delivery. Naphthas are steady at former rates. Some speculation is going on in anthracene, the production of which is diminishing in a remarkable manner. Consumers of anthracene, however, will not pay the higher prices asked by producers; and the business that has been transacted is in dealers' hands.

To-day's values may be taken as follows: Tar, 14s. 6d. to 20s. 6d. Pitch, east coast, 26s.; west coast, 24s. Benzols, 90's, 7d.; 50's, 7¾d. Toluol, 10d. Solvent naphtha, 1s. Heavy naphtha, 1s. Crude, 30 per cent., naphtha, 3d. Creosote, 3½d. Heavy oils, 57s. 6d. Carbolic acid, 60's, 2s.; 75's, 2s. 8d. Creosote salts, 45s. Anthracene, "A," 4½d.; "B," 3½d.

Sulphate of Ammonia is easier; and the strain of supplying orders before the expiration of last month is over. But, if report can be relied upon, dealers have still very large quantities to buy to cover forward sales. The price has receded somewhat, and may be taken at £10 15s. to £10 17s. 6d., less 3½ per cent. at all ports.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—No further development of any moment can be reported in the coal trade of this district. The upward move that has so far taken place in prices is, however, being fairly established; and there seems now to be no question that, when next year's contracts come to be dealt with, collieries will hold out for an advance on very much the basis indicated in previous reports. For all descriptions of fuel, there has been a brisk demand during the past week; the holiday stoppages having necessarily somewhat restricted the output, and caused temporarily lessened supplies upon the market. For house-fire qualities there is still a fairly good demand at full list rates; but any further advance on current quotations, which in some quarters is still being mooted, is not likely to receive general support. Much the same remarks apply to the lower qualities of round coal. At the pit, best Wigan Arley is quoted at 12s. to 12s. 6d. per ton; Pemberton four-feet and seconds Arley 10s. 6d. to 11s., common house-fire qualities 9s. 6d. to 10s., and good steam and forge coals 9s. Supplies of engine classes of fuel continue, if anything, short to meet requirements, and, so far, collieries have experienced no difficulty in securing the maximum advance in prices. Engine fuel is firm at 5s. 3d. to 5s. 6d. per ton at the pit for common slack, 5s. 9d. to 6s. for medium, and 6s. 6d. to 6s. 9d. for best sorts. There is a moderate enquiry for shipment; and as supplies have not been very plentiful, prices have stiffened up slightly—ranging from 9s. 6d. to 10s. per ton as the minimum for ordinary qualities of steam coal delivered at the ports on the Mersey.

Northern Coal Trade.—There has been a fuller demand for coal of late, probably to replenish stocks that had been exhausted during the holidays. Best Northumbrian steam coals have been in exceptionally good demand, and are now from 11s. 6d. to 11s. 9d. per ton f.o.b. Second-class steam coals are about 10s. 6d. per ton, and steam smalls 5s. 9d. In gas coals, the demand is now dropping towards the summer level; but there is a larger demand for export, so that there is still full work for most of the collieries. The price generally quoted for good Durham gas coals is 8s. 6d. per ton f.o.b.; but there is a variation between 3d. below and 6d. above this amount (according to the amount contracted for) by some of the producers. For gas coke there is a little better inquiry, without alteration in the price.

Scotch Coal Trade.—There is a large output, and the upward tendency of prices seems to have received a check. Under the newly adjusted scale of wages, the miners are working industriously; and the increased yields are having a steadying effect on the market. Ell, the favourite export coal, is the only exception to the shading experience—the demand for it growing as the shipping season comes on. The prices quoted are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 9s. 9d. to 10s., and splint 9s. 6d. to 9s. 9d. The shipments for the week amounted to 169,542 tons—an increase upon the previous week of 58,361 tons, mostly due to increased exports from Fife, and an increase upon the corresponding week of last year of 29,561 tons. For the year to date, the total shipments have amounted to 1,803,333 tons—an increase of 98,223 tons upon the same period of last year.

Prepayment Meters at West Bromwich.—The prepayment meter system introduced into West Bromwich about three years ago has proved an unqualified success; these meters being fixed in about one-third of the houses in the borough. The aggregate number in operation at the present time is 4120. During the past year about 2000 were put in; and the demand is increasing at a rapid rate.

Brentwood Gas Company, Limited.—The ordinary general meeting of this Company was held on the 30th ult., under the presidency of Mr. J. Biggs. The Secretary (Mr. C. A. Fielder) presented the report for the past year, in which it was stated that the Company took over the business of the Brentwood Gaslight and Coke Company on Nov. 15, 1898, under an agreement of that date by which the profits earned up to that time, after the deduction of any sum set aside to reserve, were to be paid over *pro ratâ* to the shareholders in the old Company. These profits amounted to £2104. The profits of the new Company from Nov. 16 to Dec. 31, 1898, amounted to £327, which it was proposed to apportion as follows: To make up with the £2104 above mentioned a sum sufficient to pay 10 per cent. to the shareholders, £304; to place to the reserve account, £10; and to carry forward £13—total £327. It was proposed to pay the shareholders 10 per cent. per annum on their capital, being 10 per cent. from Jan. 1 to Nov. 15, 1898, in respect of the sum payable under the agreement, together with 10 per cent. per annum from Nov. 16 to Dec. 31, 1898, in respect of the profits earned during this period by the new Company. The Chairman, in moving the adoption of the report, said it was gratifying to know that the consumption of gas was steadily increasing. The report was unanimously adopted.

The Wenlock Gas-Works.—On April 9, 1897, the Wenlock Sanitary Committee resolved to purchase from the owner, the Much Wenlock Gas-Works for £1500; and they obtained the sanction of the Town Council to borrow £2000 for the purpose, and to enable them to carry out certain improvements recommended by Mr. W. North. On application being made to the Local Government Board for sanction to the loan, the Board pointed out that a Provisional Order was necessary to carry on the undertaking. This, of course, meant some considerable delay; and as the vendor was anxious to complete the sale as early as possible, Mr. C. G. Milnes Gaskell consented to find the £2000 (at 3 per cent. interest) to enable the purchase to be completed. The works were conveyed to this gentleman on July 17, 1897; and it was agreed to repay him the £2000 as soon as the Provisional Order was secured. The sanction to the loan has now been received; but the term of repayment is fixed at 20 years, instead of the 30 years asked for. The price of gas has been reduced from 7s. 6d. to 6s. per 1000 cubic feet; and during the past nine months, the consumption has increased by about 15 per cent. The Provisional Order fixed the maximum price of gas to private consumers at 6s. per 1000 cubic feet. No profit can, however, be credited to the general district rate so long as the price to private consumers exceeds 5s. On the other hand, no expenses of maintaining and carrying on the undertaking (other than the annual instalment of principal and interest) are to be defrayed out of the general district rate, when the price of gas to private consumers is less than 6s. A small profit has been made on the working since the transfer of the concern, after payment of expenses and interest on loan; but some of the members of the Sanitary Committee are a little dubious as to whether their new possession will be a profitable one.

Projected Improvements at the Carnarvon Gas-Works.—At the request of the Carnarvon Town Council, Mr. Woodall has lately inspected the gas-works, and made recommendations as to the re-arrangement of portions of the plant, and provision for new purifiers, &c. It is stated that the scheme will cost a sum not exceeding £3000.

The Farnham District Council and the Gas Company.—The Clerk to the Farnham District Council has received a copy of a letter addressed to their Parliamentary Agents, from the Board of Trade, stating that a Provisional Order has been granted to the Farnham Gas Company, without the suggested purchase clause being inserted. The Board of Trade express no opinion that might prejudice the position of either side, in case the question should have to be decided by Parliament in connection with the Bill which will be introduced in due course for the confirmation of this and other Orders of the Department.

High Wycombe Gas and Water Supply.—At the recent half-yearly meeting of the High Wycombe Gas Company, the report presented justified the Directors in recommending a dividend at the rate of 6 per cent. for the half year ending Dec. 31, on the ordinary shares, and at the rate of 4½ per cent. on the additional shares, free of income-tax, and enabled them to place £250 to the reserve fund. The number of automatic meters in use is now over 602; and there are also some 481 cookers and grillers supplied and let out on hire. The whole of the extensions (carried out under the supervision of Mr. J. F. Wicks, the Manager and Secretary) were in operation during the half year; and the Directors reported that they were working very satisfactorily. The report was adopted. At the annual meeting of the Water Company, the Directors reported satisfactory progress in the past year. The profit amounted to £1106; and a sum of £936 was available for distribution. A dividend of 10 per cent. was declared. Praise was accorded to the Engineer and Secretary (Mr. Wicks) for his efforts on behalf of the Company, and especially for the way in which the new works had all been carried out under his supervision. The Local Authority have approached the Company on the subject of the purchase of the undertaking.

The Main-Laying Question in St. Pancras.—In the "JOURNAL" for the 14th ult., we noticed the proceedings instituted by the Board of Trade, at the request of The Gaslight and Coke Company, in connection with the Company's application to the Board to authorize the laying of mains in a certain part of the parish of St. Pancras without the consent of the Vestry. The result, it may be remembered, was unfavourable to the Vestry; and at their last meeting before Easter, the Highways Committee submitted a letter from their Solicitors in reference to the matter. The writers characterized the decision as "very unfair," and stated that the order of the Board was generally "in a very peremptory tone." They added that they had not been able to mention the subject to Mr. Corrie Grant, the Counsel who represented the Vestry at the inquiry, but that they would take an early opportunity of doing so; and they inquired whether the Vestry would like to see him, or would be content to accept the decision. The Committee made no comment upon the letter, but merely suggested that a cheque should be drawn for the amount of the Solicitors' costs. The report and recommendation made to this effect were adopted without any discussion. The order of the Board set forth that the sum of £39 18s. was due to him in respect to expenses incurred in relation to the inquiry; and they ordered the Vestry to pay it.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 907.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p. c.	22½—23½	..	4 9 4
100,000	10	,,	7½	Do. 7 p. c.	16—17	..	4 8 3
300,000	100	Jan. 3	5	Australian 5 p. c. Deb.	104—106	..	4 14 4
200,000	5	Nov. 11	6	Bombay, Ltd.	6¾—7¼	..	4 2 9
40,000	5	,,	6	Do. New, £4 paid	4¾—5¼	..	4 11 5
880,000	Stk.	Feb. 24	12	Brentford Consolidated	275—280	..	4 5 9
240,000	,,	,,	9	Do. New	213—218	..	4 2 7
50,000	,,	,,	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
159,375	,,	Dec. 15	4	Do. 4 p. c. Deb.	128—133	..	3 0 2
220,000	Stk.	Mar. 29	11½	Brighton & Hove Orig.	265—270*	..	4 5 2
296,320	,,	,,	8½	Do. A. Ord. Stk.	194—197*	..	4 6 4
973,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max.	125—130	..	3 16 11
420,000	20	Mar. 29	10	British	47—49*	..	4 1 8
50,000	10	Feb. 24	12	Bromley, Ord. 10 p. c.	25—27	..	4 8 11
75,000	10	,,	9	Do. 7 p. c.	20—22	..	4 1 10
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd.	10¾—11¼	+½	5 6 8
220,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb.	102—104	..	3 16 11
150,000	20	Mar. 10	8½	Cagliari, Ltd.	28—29	..	5 13 10
100,000	10	Sept. 29	7	Cape Town & Dis., Ltd.	14—15	..	4 13 4
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	57—59	..	5 1 8
550,000	Stk.	Oct 13	13½	Commercial Old Stock	315—320	..	4 4 5
200,750	,,	,,	10½	Do. New do.	245—250	..	4 4 0
200,750	,,	Dec. 15	4½	Do. 4½ p. c. Deb.	145—150	..	3 0 0
800,000	Stk.	Dec. 15	10	Continental Union, Ltd.	208—208	..	4 16 2
200,000	,,	,,	7	Do. 7 p. c. Pref.	187—192	..	3 12 11
51,600	Stk	Feb. 24	14	Croydon A 10 p. c.	305—310	..	4 10 4
168,400	,,	,,	11	Do. B 7 p. c.	255—265	..	4 3 0
555,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p. c.	130—135	..	3 17 9
60,000	,,	,,	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
486,090	10	Jan. 27	11	European, Ltd.	23—24	..	4 11 8
354,060	10	,,	11	Do. £7 10s. paid	17—18	..	4 11 9
14,993,075	Stk.	Feb. 10	4%	Gas-light & Coke Ord.	116—118	+½	4 3 0
2,800,000	,,	,,	3½	3½ p. c. max.	101—103	..	3 8 0
3,799,735	,,	,,	4	and 4 p. c. Con. Pref.	127—129	..	3 2 0
3,843,975	,,	—	—	Coke & 3 p. c. Con. Deb.	101—103	..	—
70,000	10	Nov. 11	8	Hongkong & China, Ltd.	13½—14½	..	5 10 4
3,800,000	Stk.	,,	10	Imperial Continental	223—228	..	4 7 9
376,400	100	Feb. 1	4	Do. 4 p. c. Deb. Red.	98—101	..	3 19 3
473,600	Stk.	Feb. 10	3½	Do. 3½ p. c. Deb.	102—105	..	3 6 8
75,000	5	Nov. 30	6	Malta & Medn., Ltd.	5—5½	..	5 9 1
560,000	100	Apl. 4	5	Met. of 5 p. c. Deb.	111—113*	+½	4 8 6
250,000	100	,,	4½	Melbourne 4½ p. c. Deb.	105—107*	+½	4 4 1
641,920	20	Nov. 11	5	Monte Video, Ltd.	15½—16½	..	6 1 3
617,946	Stk.	Feb. 24	9½	Newc'tle & Gatesh'd Con.	228—233	..	3 19 5
264,855	Stk.	Dec. 30	3½	Do. 3½ p. c. Deb.	107—110	..	3 3 8
					* Ex div.		

Issue.	Share.	When ex-Dividend	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	Nov. 30	8	Oriental, Ltd.	7½—7¾	..	5 3 3
135,000	5	,,	8	Do. New, £4 10s. pd.	6½—6¾	..	5 6 8
15,000	5	,,	8	Do. do. 1879, £1 pd.	1½—1¾	..	4 11 5
60,000	5	Mar. 29	7	Ottoman, Ltd.	4¾—5¼*	..	6 13 4
500,000	100	Dec. 1	6	People's Gas of Chicago 2nd Mtg. Bonds	102—106	..	5 13 2
848,070	10	Oct. 13	6	River Plate Ord.	11—11½	..	5 4 4
250,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb.	103—105	..	3 16 2
250,000	10	Mar. 29	10	San Paulo, Ltd.	16¼—17¾*	+½	5 14 3
135,000	Stk.	Mar. 29	10	Sheffield A.	237—240*	..	4 3 4
209,053	,,	,,	10	Do. B.	237—240*	..	4 3 4
447,427	,,	,,	10	Do. C.	237—240*	..	4 3 4
5,600,000	Stk.	Feb. 10	5¼	South Metrop., 4 p.c. Ord.	140—143	..	3 14 7
1,460,000	,,	Jan. 13	3	Do. 3 p. c. Deb.	101—103	..	2 18 3
—	—	—	—	Tottenham and A.	—	—	—
—	—	—	—	Edmonton B.	—	—	—
182,380	10	Dec. 30	5	Tuscan, Ltd.	9½—10½	..	4 15 3
149,900	10	Jan. 3	5	Do. 5 p. c. Deb. Red.	99—101	..	4 19 0
				WATER COMPANIES.			
746,184	Stk.	Dec. 30	11	Chelsea, Ord.	318—323	−2	3 8 1
150,000	,,	,,	5	Do. 5 p. c. Pref.	168—173	..	2 17 10
160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75	150—155	..	2 18 1
175,785	,,	Mar. 29	4½	Do. 4½ p. c. Deb.	155—160*	..	2 16 3
1,720,560	Stk.	Oct. 13	7	East London, Ord.	318—323	..	3 2 9
654,740	,,	Dec. 30	4½	Do. 4½ p. c. Deb.	156—159	−2	2 16 7
390,000	,,	,,	3	Do. 3 p. c. Deb.	102—104	..	2 17 8
700,000	50	Dec. 15	7½	Grand Junction 10 p. c. max.	172—175	..	3 5 3
310,000	Stk.	Mar. 29	4	4 p. c. Deb.	135—140*	..	2 17 2
708,000	Stk.	Feb. 10	14	Kent	357—362	−3	3 17 4
160,000	,,	,,	7	Do. New, 7 p. c. max.	210—215	..	3 5 1
1,043,800	100	Dec. 30	10½	Lambeth, 10 p. c. max.	298—303	..	3 9 4
406,200	100	,,	8	Do. 7½ p. c. max.	230—235	..	3 8 1
350,000	Stk.	Mar. 29	4	Do. 4 p. c. Deb.	135—140*	..	2 17 2
500,000	100	Feb. 11	13½	New River, New Shares	433—438	..	3 2 9
1,000,000	Stk.	Jan. 27	4	Do. 4 p. c. Deb.	137—142	..	2 16 8
902,300	Stk.	June 29	7½	South-wark and Ord.	203—208	..	3 12 1
126,500	100	,,	7½	7½ p. c. max.	190—195	..	3 16 11
489,200	Stk.	,,	5	5 p. c. Pref.	168—171	..	2 18 6
1,019,585	,,	Oct. 13	4	Vauxhall 4 p. c. A Deb.	137—142	..	2 16 4
1,155,066	Stk.	Dec. 15	10	West Middlesex	300—305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p. c. Deb.	159—163	..	2 15 7
200,000	,,	Mar. 10	3	Do. 3 p. c. Deb.	101—103	..	2 18 3
					* Ex div.		

The Disposal of Gas Profits at Oldbury.—Last Friday, the Finance Committee of the Oldbury District Council presented the estimates of expenditure for the ensuing year, which showed that the total expenditure for Oldbury was estimated at £16,395 13s. 9d. The income was £1719 14s. 3d., and the net amount required from the rates for the twelve months was £14,675 10s. 6d. Mr. A. Thompson, who moved the adoption of the report, pointed out that last year they went beyond their estimates by £1318; and but for the help of the Gas Committee, who transferred £1000 to the assistance of the rates, they would have exceeded them to a far greater extent. They expected a further £600 from the Gas Committee; but then the balance against them at the bank would be £211, which would probably mean an addition of 1d. in the pound to the rates. Mr. J. W. Wilson, M.P., said the Gas Committee could only promise to give £400 to the relief of the rates; but if they could hand over more they would do so.

Kingston-on-Thames Gas Company.—At an extraordinary meeting of this Company last Thursday week, the salary of the Secretary, Mr. J. A. Fricker was raised by £50 per annum; and two new Directors were elected at a remuneration of £150 per annum each. The meeting was a private one; but the proceedings are described as having been of a very animated character—there being considerable opposition to the proposal to strengthen the directorate. One of the arguments advanced in its support was that it would be necessary before long to apply to Parliament for further powers with regard to the extension of mains, &c., and that in view of the opposition that might arise, it was desirable to have a larger Board. Two of the Directors were opposed to the enlargement; and another speaker thought that the £300 to be paid to the new Directors ought to go in a reduction of the price of gas. The five Directors already in office divide among themselves £750 per annum. The vote regarding the salary of Mr. Fricker was a unanimous one.

Prepayment Meters for Wigan.—The minutes of the Gas Committee of the Wigan Corporation which came before the Council last Wednesday contained an item of £1000 for prepayment meters which caused some alarm, because it was misunderstood. It was merely one of a number of items contained in a report by the Gas Engineer (Mr. J. Timmins) which is to go up to the Local Government Board in respect of gas capital requirements. Of course, before anything is done in the way of introducing slot meters, the matter will have to receive the sanction of the Council. Judging from the remarks of one speaker (Mr. M'Quaid), the members regard these meters in a more favourable light than they did. He said that about three or four years ago he was responsible for bringing this matter before the Gas Committee, and it was repudiated. At the last Committee meeting, however, the Chairman gave what appeared to be a very satisfactory explanation, which was that a great improvement had taken place in these meters, which now were found to work satisfactorily in other towns, and it would be a convenience to introduce them into Wigan. He (Mr. M'Quaid) quite agreed with their introduction, because he thought they would be a great convenience to the general public; and he had not the slightest doubt the result would be that a large consumption of gas would take place through their adoption.

The Gas Workers' Union held the tenth anniversary of their foundation on the 2nd inst., in Finsbury Park; the gathering including many members of other labour organizations. The General Secretary (Mr. William Thorne), in the course of an address, stated that they had accumulated funds to the amount of £16,500, and a membership of 44,000. He read a list of places in which members of the Union had obtained higher wages last year, and added that these increases meant a sum of £200,000 a year to the workers. A resolution congratulating the Union on its continued success was passed.

An Unventilated Geyser again the Cause of Death.—Elizabeth Matilda Ladd, 24, wife of the porter at St. Paul's Hospital, 13A, Red Lion Square, was found dead in a bathroom there last Friday week. The hot water required for the bath was supplied by a geyser, heated by gas. There was no flue from the geyser outside; and medical evidence at the inquest showed that suffocation had resulted from the room being vitiated by the poisonous fumes. Deceased was found by her husband completely immersed in the bath, which was almost full, the water still running. At the close of the inquest, a verdict of "Death by misadventure" was returned.

Birkdale and the Southport Gas Supply.—The Lighting Committee of the Birkdale District Council reported, at the meeting of the body last Tuesday, that Mr. C. R. Bellamy had tested the gas on Feb. 24 and March 7, and found the illuminating power to be (as indicated by the batswing burner) 16·79 and 15·80 candles respectively. Moving the adoption of the minutes, Mr. Hartly said these tests showed an improvement of 3 to 4 candles. He thought this would satisfy the consumers of gas in Birkdale that the tests made on behalf of the Council were *bonâ-fide* ones. They did not always secure the same result from their tests as in Southport—21 candles; but they gave a genuine test. He complained of a circular which had been sent out by the Southport Corporation Gas Committee with the bills of the Birkdale gas consumers, and which he described as misleading. The circular referred to the supply at Ainsdale and Birkdale of burners gratis. His experience was that the burners given free increased the consumption, and gave no better light. Anyone who did not understand the circumstances would think it was fearfully hard upon Southport to be tied to supply gas to Birkdale, and to pay £2000 a year for doing so. It was known that Birkdale was only too anxious to cancel the arrangement with Southport. It was quite true that Southport paid a rebate of £2000 a year; but nothing was said about the profit which was made out of Birkdale. The Chairman (Mr. T. O. Clinning) said he believed they were only receiving about £1900 this year from Southport. Under the Act of Parliament, Southport paid 3½d. per 1000 cubic feet for the right to supply gas, and 4½d. per 1000 feet for the interest on the mains. As the gas cost Southport, if his recollection was correct, 2s. 1d. per 1000 feet to supply, they made 1s. 5s. per 1000 cubic feet out of Birkdale. He said, without fear of contradiction, that the quality of the gas was as bad as it could be; and after they had the report of their Medical Officer as to the other properties of the gas, it was probable that they would have to take up that question also. The minutes were adopted.

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Merrifield—Westcott—Pearson Patents.

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The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cubic Feet Daily.
BLACKBURN	1,250,000
WINDSOR STREET WORKS, BIRMINGHAM	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250 000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.,	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000

AND ADDITIONAL WORK.

Retort-House Machinery for the Brighton and Hove Gas-Works.—The Directors of the Brighton and Hove Gas Company have decided to introduce stoking machinery into their works; and they have placed an order with Sir William Arrol and Co., of Glasgow, for a complete installation of their Arrol-Foulis plant. Owing to the construction of the retort-houses, it has been considered advisable to adopt the type of charging-machine which Sir William Arrol and Co. have supplied to the South Metropolitan Gas Company for their Vauxhall and Rotherhithe stations. The charging-machine has attached to it a small elevator which is capable of raising coal and depositing it in the hopper carried on the machine itself. A continuous coal-store is provided on each side of the house, running parallel with the benches. The lower portion is open, so that a skirt of coal is formed along the floor; thus permitting the machines to feed themselves as they travel along the retort-house. The elevator on the charging-machine is driven by hydraulic power; and a small hydraulic engine is employed for moving the machine along the house; but as the water used is returned to the hydraulic pumps, there is no expense attached to the system, due to the cost of the water employed.

New York Water Supply.—In the course of a paper read by Mr. G. Livingstone, the Surveyor to the Vestry of St. George's, Hanover Square, before the Association of Municipal and County Engineers, he gave some particulars of the water supply of New York, which he characterises as the finest in the world. We have on previous occasions described the works by which the city is supplied; but the following figures may be interesting. The main source of supply is the Croton River, and a group of lakes, some 40 miles to the north. The water is conveyed by the Croton aqueduct—a conduit of brick and stone, completed in 1842, and able to deliver 96 million gallons a day. An additional 16 million gallons are derived from the Broux River. The Croton aqueduct crosses the Harlem River upon the viaduct known as High Bridge. In Central Park, four miles below High Bridge, is the retaining reservoir, capable of holding 1030 million gallons; and just below it is the receiving reservoir, which has a capacity of 150 million gallons more. Besides these, there are three high-service reservoirs—one capable of holding 11 million gallons. The distributing mains have a total length of about 660 miles, and feed 8420 fire hydrants, in addition to the private supply-pipes. A new aqueduct for the provision of an increased supply has been in course of construction for several years past. The Croton watershed is also the source of the additional supply; but new retaining reservoirs have been, or will be, built to store as much as may be thought desirable of the 400 million gallons of water now running to waste. The new aqueduct is a tunnel 14 feet in diameter and upwards of 30 miles in length, carried through solid rock at an average depth of 500 feet below the surface. It leads to the reservoir in Central Park. No addition will be necessary to the present system of distributing mains. When the storage reservoirs which are at present in course of construction have been completed, the carrying capacity of the aqueduct will be 300 million gallons daily. The average daily supply of water per head of the population in New York is 100 gallons, as compared with 158 in Washington, 75 in Chicago, 55 in Montreal, 50 in Glasgow, 35 in London, and 28 in Paris.

New Joint-Stock Companies.—The Mablethorpe and Sutton Gas Company, Limited, has been registered with a capital of £10,000, in £10 shares, to acquire the gas-works now carried on by Richard Day and others at Mablethorpe, and to supply that town, Sutton-on-Sea, and other places in Lincolnshire, with gas. The Carbide of Calcium Supply Syndicate, Limited, with a capital of £15,000, in £1 shares, has been formed to adopt a certain agreement, and to manufacture, sell, and deal in carbide of calcium and its residual products.

Wooden Water-Pipes.—The recent unearthing of some of the old wooden pipes once used for the supply of water to London has aroused interest in these relics; and in the current number of the "Builder" Mr. Leonard Redmayne, who saw some lately near the Marble Arch, asks if it is commonly known by what process they were bored and fitted. He says those he saw were apparently spigoted one into the other; but he thinks there must be someone in existence who can say definitely how the connections were made, and whether the pipes were subject to any process of seasoning or induration.

Bristol Water-Works Company.—The report and accounts of this Company (which were noticed in a recent issue) were presented at the annual meeting of the shareholders by the Chairman, Mr. Edward Bush. In the course of his remarks, he stated that the revenue from water-rates for the year had been £117,779, which was an increase compared with the previous year of £3791. They had laid 2221 new services, which was 333 in excess of those connected in 1897. The expenditure at Chelvey was about £2000 more; but it must be remembered that they had six months without rain, which necessitated the pumping of a great deal more water, and consequently the cost of coal was somewhat increased. There had been a rise of about £700 in the local rates. A twelvemonth ago the Directors intimated that the Rating Authorities had threatened to increase their rates; and they said they would have to appeal. But they had settled the matter in a satisfactory manner for some time to come. During the preceding week, the Company had been in opposition against the Gas Company in the House of Lords. The Directors were very reluctant to take up this position, as they had always been on good terms with the Gas Company; but they had a clause in their Bill for new works at Ashley Hill, where they were advised that the Water Company had not sufficient protection against the pollution of the Boiling Wells and stream. They tried to get the Gas Company to give them the necessary protection clause, but without success. The Committee of the House of Lords, however, had given them (the Water Company) what they wanted. As regarded the Yeo Valley works, it was hoped to get the embankments, &c., finished in the summer. Meanwhile it was necessary to obtain the engines. They had experienced considerable difficulty in this particular; for twelve months previously they had sent to 29 firms for tenders, and only received one reply. Since then fresh tenders had been obtained; and they were going to consider them. The report and accounts were adopted; and a dividend of 7 per cent. on the ordinary, and of £4 18s. per cent. on the 7 per cent. maximum shares was declared. Subsequently an extraordinary meeting was held, when the creation and issue of additional 3½ per cent. debenture stock was authorized.

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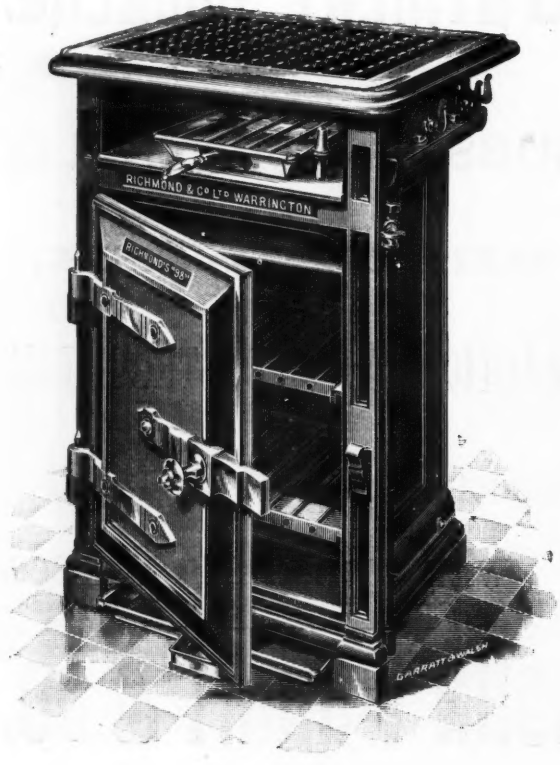
West Gloucestershire Water Company.—At the recent half-yearly general meeting of this Company, the accounts presented showed that in the six months ending Dec. 31 there was a net profit of £1823 earned, which, together with £191 brought forward made a total of £2014 to the credit of the net revenue account. From this balance the Directors recommended the declaration of a dividend (less income-tax) at the rate of 4 per cent. per annum, on the 1884 shares, and £2 16s. upon the 1887 shares. These would absorb £1839, and leave a balance of £175 to be carried forward. In moving the adoption of the report, the Chairman (Mr. E. Horton) stated that the number of houses supplied by the Company reached 6716—being an increase of 500 during the past year; while the revenue showed an increase of rather more than £600. The report was adopted.

The Charges for Water for Road-Cleansing Purposes.—At the last meeting of the St. Pancras Vestry, the Special Water Charges Committee reported that they had caused inquiries to be made of the other Metropolitan Local Authorities who are served by the New River and the West Middlesex Water Companies in regard to the charges for water supplied for public purposes. The Committee found that in several instances these Authorities had obtained a reduction in the charge for water used for road-cleansing purposes to 6d. per 1000 gallons, consequent upon the decision given in the Lambeth case. The New River Company have been charging the Vestry 8½d. per 1000 gallons, with an additional amount for meter-rental; while the West Middlesex rate is 8½d., less 10 per cent. —the Vestry providing the meters. In this connection, the Committee announced that a letter had been received from Mr. J. Searle, the Clerk of the New River Company, voluntarily offering to supply water for street work during the present season at 6d. per 1000 gallons. The Vestry resolved to accept the offer, and to thank the Company for the reduction; and at the same time to approach the West Middlesex Company with a view to obtaining a similar concession.

Littlehampton Water Supply.—Mr. F. H. Tulloch, M. Inst. C.E., held an inquiry at Littlehampton last Wednesday, on behalf of the Local Government Board, into the application of the Urban District Council for permission to borrow £1258 for purposes of water supply. Mr. E. J. Mostyn represented the Duke of Norfolk. Mr. A. Shelley, the Clerk to the Council, said that £558 of the loan was for the payment of excessive expenditure in laying the water-mains from Arundel to Littlehampton. This work was estimated to cost £3000, which sum the Duke of Norfolk had paid. But the contract price was £3447; and this, together with additional expenses, would leave £558 to be paid by the Council out of the rates. The remainder of the loan asked for—£700—was to enable the Council to comply with the demands of the Board by boring for water at Warningcamp, with a view to obtaining a permanent supply for the town. The Surveyor (Mr. Howard) estimated this work to cost £500; but the Council asked for an additional £200 as the result of their experiences with regard to estimates. Mr. Shelley explained that the extra expense had been incurred in consequence of the Council laying a larger main than was at first intended, in order to provide for the growth of the town. After the inquiry had concluded, the Inspector viewed the site of the spring.

Gomersal District Council and the Water-Works.—At the meeting of the Gomersal District Council last Wednesday correspondence was read which had passed between the Council, the Local Government Board, the Bradford Corporation, and the Gomersal Water Company with reference to the transfer of the water-works to the Council. It appeared that the Local Government Board had intimated that they would only sanction a loan for ten years, on the ground principally that there was no certainty that the Bradford Corporation would continue the supply of water after the expiration of the existing agreement with the Company; but a letter had been received from the Town Clerk saying that the Corporation would be willing to enter into a fresh agreement with the Council for a period of thirty years on the basis of 9d. per 1000 gallons. A copy of this letter had been transmitted to the Local Government Board; and the Council had held a special meeting, at which it was resolved to take over the undertaking of the Water Company from the 1st inst., and to pay the Company interest at the rate of 5 per cent. on the amount of the purchase-money until the sanction of the Local Government Board is obtained and the money actually paid.

The Airdrie and Coatbridge Water Bill.—A Scottish correspondent writes: The fight between the Corporations of Airdrie and Coatbridge and the local Water Company has ended in a victory for the latter; their Bill having been read the third time in the House of Lords. It is a pity when co-ordinate bodies do not agree upon such an important matter as the water supply of the district; but circumstances must be looked into, and in this instance there is something to be said on both sides. In the first place, the Cowgill scheme of the Company—which has, in fact, broken down, and is now about to be patched up—was a too ambitious one for the towns of Airdrie and Coatbridge to undertake. The only justification for going so far for water would have been the prospect of getting it in such unlimited quantity that it could be sold cheaply, and thus make the district a desirable one for manufacturers. It is in this matter of quantity that the scheme has broken down; and it is natural that the Corporations should view with dismay the probability of the rates rising to more than 1s. 4d. in the pound—it may be to 2s. But then, the fault lies with themselves in allowing the Cowgill scheme to be approved by Parliament in 1892. Had they at that time come forward, and expressed a desire to purchase, as they do now, there is no doubt that Parliament would have given them the opportunity; and they could then have introduced a scheme which would have been more suitable for the districts to be served. When I speak of the Cowgill scheme being too ambitious for Airdrie and Coatbridge, what I have in my mind is that these two towns, with a population of less than 70,000, went just about as far for a water supply as did Glasgow, the population of which is now upwards of 700,000; and with this very great difference, that whereas the Glasgow Corporation, when they went to Loch Katrine, found the water impounded and ready to be taken, in the case of Airdrie and Coatbridge a series of reservoirs had to be constructed before any water could be got. The Loch Katrine water has certainly helped as much as anything to make Glasgow what it is now; and if the intention was to make Airdrie and Coatbridge a rival to Glasgow, which it was open to them to do, the scheme adopted was, I am afraid, not one which was likely to succeed.



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From **63s.** upwards.

Kimberley Water-Works Company, Limited.—The report for the past year shows that, after providing £6174 for interest on debentures and debenture stock, and £713 for the usual items of depreciation, the net available profit, including £734 interest on investments, is £21,544. Out of this the Directors propose to write off £3294 from the construction account, to transfer £2500 to the contingency fund, and to pay a dividend of 5 per cent. for the year—absorbing £15,750.

Incandescent Gas Lighting in Clerkenwell.—The Clerkenwell Vestry have decided to introduce incandescent gas lighting in the streets; and the Pentonville district will receive the first attention. About 800 lamps are on order. The cost of the change will be something like £1500; but the benefits resulting therefrom are obvious.

The Bangor Electric Lighting Bond.—The recommendation of the Lighting Committee of the Bangor City Council that, provided the guarantors of the electric lighting bond delivered it to the Town Clerk, their application to withdraw from the agreement should be granted and the bond cancelled, came before the Council last Wednesday. In the meantime, however, a letter has been received from Mr. H. O. Hughes, who held the bond on behalf of the guarantors, stating that, as the Corporation could not, in view of Counsel's opinion, accept the proposed bond, he had cancelled the document bearing the original signatures. One or two members contended that the bond was the property of the Council, and should be given up to them. But Dr. Rowland Jones was not clear that the bond was the property of the Council; and he gave notice that he would move at the next meeting the rescinding of the resolution that the bond should be given up to the Town Clerk. Eventually an amendment was carried to refer back to the Committee their recommendation, together with the letter of Mr. Hughes.

The Rating of Reservoirs.—A deputation of members and officials of the Hampton District Council recently waited upon Sir F. Dixon-Hartland, M.P. for the division, to discuss with him various subjects affecting the district, among them being that of the rating of reservoirs. The honourable gentleman was first asked whether, in the event of the decision of the House of Lords on the question being against the Council, he would use his influence with the Government with a view to, if possible, getting the law altered by legislation. In reply, Sir Frederick stated that he had already mentioned the subject to the Government, and was given to understand that they would not bring in a Bill to deal with the question. The proper course to pursue would be, in the event of a Water Company promoting a fresh Bill, to ask for a clause to be inserted providing that the Company should pay full rates on their reservoirs. It was stated that the West Middlesex Company were bringing in a Bill in the present session. To this Sir Frederick added that, as the Company did not ask for powers to construct a new reservoir, he did not think they could do anything on this occasion. With reference to the Water Companies' Bills, the honourable member was asked to obtain the insertion of clauses providing for the payment by the Companies to the Highway Authority of an easement price in respect of all mains laid in public highways. Sir Frederick replied that he would give the matter his careful consideration.

St. Anne's Gas Company.—The accounts of this Company for the past year show a gain in the revenue account of £2868; the surplus amounting to £2114. The full dividends are to be paid on the 10 and 7 per cent. debentures, and the maximum dividend of 10 per cent. on the ordinary shares; the balance carried forward being £301. The increase in the consumption of gas during the twelve months is put down at 8 per cent. The total receipts were £6294, and the expenditure £3425.

The tender of Messrs. Gwynne and Co. for the supply of an engine and exhauster for the Stockton Gas-Works has been accepted by the Gas Committee.

The tender of Messrs. J. & S. Roberts, of West Bromwich, has been accepted by the Gas Committee of the Oldbury District Council for the supply of gas-mains.

From nine tenders received for the construction of a closed reservoir and pumping station and main extensions, the Ledbury District Council have accepted one submitted by Mr. Herbert Holloway, of Wolverhampton, amounting to £4000. The highest tender was £5885.

The Gas Committee of the West Bromwich Town Council have let the contract for the erection of the coal breakers, elevators, hoppers, girders, &c., to West's Gas Improvement Company, Limited; and Messrs. Tangyes Limited will supply 116 retort mouthpieces.

We learn that Messrs. Cutler and Sons, of Millwall, London, are receiving further orders for their system of carburetted water-gas plant. The Brentford Gas Company have placed with them the order for an extension of the plant which they erected at Southall last year; and a similar order has been received from the Folkestone Gas Company.

It appears that, owing to the great rise in the prices of American steel, the Americans are losing in competition with British firms; an instance being afforded by an order for 8000 tons of cast-iron pipes for Brazil which has been taken by a British firm, whereas Americans secured the previous order. Instead of the Americans selling in England, they are buying iron, wire rods, &c.—a striking reversal of recent experience.

At the sale to be conducted by Mr. Alfred Richards at the Mart, Tokenhouse Yard, E.C., to-morrow, £18,370 of 4 per cent. perpetual debenture stock of the Alliance and Dublin Consumers' Gas Company and £3000 of ordinary stock of the Cromer Gas Company will be submitted for public competition—in each case by order of the Directors. On the same occasion, stocks and shares in the Felixstowe, King's Lynn, and Romford Gas Companies, and the South-West Suburban and West Surrey Water Companies, will be offered.

The following exhibitions of gas appliances have lately been held: By the Davis Gas-Stove Company, Limited, at Ramsgate, with lectures by Miss M. E. Betts; at Swansea, with demonstrations by Miss Wilkinson. By Messrs. R. & A. Main, Limited, at Blackpool, Broughton (Salford), Duns, and Uddingston, with lectures by Miss Baines, Miss Taylor, Miss Playfair, and Miss Young; also, in conjunction with Messrs. John Wright and Co., in Stirling, with lectures by Miss Nellie Parker. By Messrs. Wright and Co., at Canterbury, with lectures by Miss Thwaites.

R. & A. MAIN, Ltd.

Argyle Works, GLASGOW. — **109, Farringdon Road, LONDON, E.C.**

Telegrams: "GASMAIN, GLASGOW." — Telegrams: "GASMAIN, LONDON."

BRISTOL: 28, BATH STREET. Telegraphic Address: "GOTHIC."

BIRMINGHAM: 1, OOZELLS STREET. Telegraphic Address: "GOTHIC."

MANCHESTER: 87, BLACKFRIARS STREET. Telegraphic Address: "GOTHIC."

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"Main" Cooker,

With Enamelled Grids and Shelf Guides.

SEVERAL COLOURS OF ENAMELLED LININGS.

Prices from - - £4 12s. 6d.

NEW SEASON'S LIST NOW READY.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
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ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKELMANN'S "VOLCANIC" and "VOLCUM" CEMENT. Fire Resistance up to 4500° Fahr. In use in Gas-Works all over the World.

ANDREW STEPHENSON,
182, PALMERSTON BUILDINGS,
OLD BROAD STREET,
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Telegrams: "Volcanism, London."

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see April 4, p. 883.]

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPECIAL PAINT FOR GAS-WORKS.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1769.

ECONOMY IN PURIFICATION.

INCREASE the efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP.

PATENTS FOR INVENTIONS.
Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

IMPORTANT.

REPAIR your old Retorts with Patent STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Estimates for all kinds of Retort-Settings.
Write CROWTHER, Retort Setter, and Sole Maker of Stickfast Fire Cement, Manor Street, HUDDERSFIELD.

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JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

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JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

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JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

CLERK and Accountant seeks re-engagement. Ten Years' Experience in Secretary's Office. Age 31.
Address No. 3241, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

YOUNG Man seeks Situation as Gas-FITTER, used to Iron and Compo. Can fix Meters and Stoves. Can also fill position as Meter Inspector. Testimonials to be had.
Address W. KEIRMAN, care of H. Keirman, Manager, Gas-Works, Thorney, near PETERBOROUGH.

ADVERTISER, having had 20 years' practical Laboratory experience in Coal Carbonizing, Tar Distilling, Sulphate of Ammonia and Sulphuric Acid making, Coke-Ovens, &c., is desirous of change.
Address No. 3242, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, good Retort Setters.
Apply, by letter, to JOHN WALSH AND SONS, 94, Gibbet Street, HALIFAX.

WANTED, immediately, two Draughtsmen accustomed to designing Gas-Works Machinery and Plant.
Apply to W. J. JENKINS AND CO., LIMITED, RETFORD.

WANTED, two Carbonizing Foremen, accustomed to Regenerative Furnaces and Inclined Retorts.
Apply, by letter, enclosing *copies* of three recent Testimonials as to Character and Abilities, to No. 3227, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, in a Midland Town, for four or five Months from the middle of May, a thoroughly experienced GAS-METER TESTER.
Apply, by letter, with Testimonials, and stating Wages required, to No. 3238, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, two Retort-House Fitters for Gas-Works in London. Applicants must be under 40 Years of Age. Good Wages and permanent employment for capable Men of good character.
Apply, by letter, to No. 3239, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, a thoroughly competent and experienced WORKING MANAGER for a Gas-Works in small Town in Midlands. Salary £150. A House is provided at the Works, with Coal and Gas.
Apply, by letter, stating Age and Experience, with *copies* of not less than Three recent Testimonials, to be sent to No. 3240, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SEASON 1899.

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Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

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Contractors to the Birmingham City Gas Department.

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STEPHEN CARPENTER, on the Purification of Coal Gas by Lime, Oxide of Iron, and Atmospheric Air, and the Method of Working Purifiers so that the Lime may be used a second time, with a Description of Carpenter's short Method of Working off the Sulphur Test, and Table for Calculating Results.
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WANTED, a Gas Stoker used to Shovel Charging, and Engine and Exhauster. Must be steady and industrious. Wages 26s. per week. A permanent job for a good Man.
Apply, with References as to Character, &c., to E. D. SAPEY, Manager, Gas Office, HORSHAM.

A GENTLEMAN introducing Specialities for Gas Lighting in France and Belgium wishes the SOLE REPRESENTATION of a first-class MANTLELESS INCANDESCENT BURNER.
Address Circulars and Terms to No. 3237, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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AN Experienced Manager wanted immediately for the Company's Works at Colombo, Ceylon. Free passage out and home.
Apply, by letter, stating Qualifications, to
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GAS-WORKS Manager (Working) wanted for far East. Excellent Climate. Capable of looking after everything, including the taking of Meters, &c., and keeping simple Books. Will get House free at Works, and free second-class Passage out. Name Salary required, and full Qualifications and Experience.
Apply, by letter, to A. G. WALKER AND CO., 9, Fenchurch Street, LONDON, E.C.

ALPHA Patent (Muller's) Gas-Making MACHINE, used for Country Mansion, FOR SALE; Electric Light being introduced. In splendid order. Cheap to an immediate Purchaser.
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GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE—Complete Gas Plant, consisting of Holder 40 ft. diameter by 13 ft. deep, with Guide-Framing, Inlet and Outlet Pipes, Tank for ditto, Cast Iron Condenser, Washer, Purifier, Station Meter, and Two Ovens of three Retorts each, complete with all Pipes. This Plant will be sold cheap to an immediate purchaser.
Apply to HENRY BRUCE AND SONS, Kinleith Mill, CURRIE.

FOR SALE, cheap—
Two PURIFIERS, 8 ft. square by 4 ft. deep.
Two " 5 ft. " 4 ft. "
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One EXHAUSTER, 20,000 Cubic Feet per hour.
Two " 5000 " " "
Also CONDENSERS, SCRUBBERS, WASHERS, GASHOLDERS and TANKS, VALVES, &c., &c.
Apply to SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

FOR SALE—A small high class Gas-EXHAUSTER, with Engine combined. Perfectly new. Others in progress.
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IMPROVED WATER-METER.

VALUABLE PATENT RIGHTS FOR SALE.

MESSRS. CRUIKSHANK AND FAIRWEATHER, 62, St. Vincent Street, Glasgow, are open to treat for the SALE of HALLBERG'S BRITISH PATENT No. 5119/98, and also the corresponding GERMAN, AUSTRIAN, and UNITED STATES PATENTS.

GAS Plant for Sale, cheap to clear—
RETORT IRONWORK, several good Sets.
Six-inch VERTICAL PIPE CONDENSER complete.
Four ANNULAR CONDENSERS, 32 in. by 18 ft.
EXHAUSTERS and ENGINES, several good Sets.
TOWER SCRUBBERS, 5ft. by 20ft., 5ft. by 40ft., & others.
PURIFIERS from 5 ft. square to 12 ft. square.
STATION METERS and GOVERNORS.
GASHOLDERS, 35 ft. by 14 ft. & 50 ft. by 18 ft., perfect.
VALVES of all kinds in Stock.
IRON STORAGE TANKS.
J. FIRTH BLAKELEY & Co., Thornhill, DEWSBURY.

CONTRACT FOR GAS COAL.

THE Milton-next-Sittingbourne Urban District Council invite TENDERS for the supply and delivery, during the Year ending May 2, 1900, of 1000 Tons of GAS COAL, to be supplied at such times and in such quantities as the Manager of the Gas-Works shall direct.

Full Information, with Forms of Tender, can be obtained on application to the Manager, Mr. A. Davison, Gas-Works, Milton-next-Sittingbourne.

Sealed Tenders, which must be on the form supplied, should be addressed the Chairman of the Milton-next-Sittingbourne Urban District Council, and endorsed "Tender for Gas Coal."

The Tenders should be sent or delivered to me, on or before Monday, May 1 next.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
(Signed) W. PARHAM,
Clerk.

Milton-next-Sittingbourne,
April 6, 1899.

WALLASEY GAS-WORKS.

TO COAL MERCHANTS AND OTHERS.

THE Wallasey Urban District Council are prepared to receive TENDERS for the supply of about 26,000 Tons of CANNEL and GAS COAL for their Gas-Works, delivered in Waggons at Duke Street, Birkenhead, separately, for One, Two, or Three Years, from the 30th of June next.

Printed Forms of Tender with Specifications and any further Information may be obtained on application to the Engineer, at the said Works.

Sealed Tenders, addressed to me as under, and endorsed "Gas, &c., Committee—Tender for Coal," to be sent per post so as to reach me not later than Nine o'clock in the morning of the 24th inst., at which hour they will be opened and considered.

The Contractor will be required to enter into a bond, with approved sureties, for the due performance of the Contract.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
H. W. COOK,
Clerk to the Council.

Public Offices, Egremont, Cheshire,
April 7, 1899.

WALLASEY URBAN DISTRICT COUNCIL.

CONTRACTS FOR STORES,
GAS AND WATER AND ELECTRICAL WORKS.

THE Wallasey Urban District Council are prepared to receive TENDERS to Supply, for a period of Twelve Months from the 30th of June next, the following among other ARTICLES; being the principal Stores required for the use of their Gas, Water, and Electrical Works—viz.,

Stop Cocks, Main Taps, Ferrules.
Fire Bricks and Retorts.
Fire Spades and Coal Shovels.
Iron (Bar, Sheet, and Plate).
Lime.
Paper, Insulated Concentric Cables.
Oils.
Lead and Wrought-Iron Pipes, Cast-Iron Main Pipes.
Cotton Waste.
Meters (Gas, Water, and Electricity).
Lamp Columns and Lamps.
Main Switches and Cut-Outs.

Further Particulars, with Forms of Tender, may be had, and Samples inspected, on application at the Gas and Water Engineer's Office, at the Works, Great Float, near Birkenhead.

Sealed Tenders, which must be on the printed forms, addressed to me as under, and endorsed "Gas, &c., Committee—Tender for Stores," to be sent per post so as to reach me not later than Nine o'clock in the morning of the 24th inst.; and any Tenders arriving after that time will not be considered.

The Contractors will be required to enter into formal contracts, and may also be required to give security, in conformity with the Public Health Act, 1875.

The Council reserve the power to accept the whole or part of a Tender, and do not bind themselves to accept the lowest or any Tender.

By order,
H. W. COOK,
Clerk to the Council.

Public Offices, Egremont, Cheshire,
April 7, 1899.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the supply of 10,000 Tons of COAL and 2000 Tons of CANNEL.

Specification and Form of Tender may be obtained upon application to Mr. W. Whatmough, Gas Manager.

Sealed Tenders, marked "Coal," to be sent to me not later than Tuesday, April 18, 1899.

By order,
J. H. BALDWICK,
Town Clerk.

Municipal Buildings, Heywood,
March 15, 1899.

BOROUGH OF DARWEN,
(GAS DEPARTMENT.)

TO TAR DISTILLERS.

THE Corporation are prepared to receive TENDERS for the whole of the surplus GAS TAR produced at their Works for One Year from April 1, 1899.

Form of Tender and all Information can be obtained from the Engineer and Manager, A. H. Smith, Gas-Works, Darwen.

Sealed Tenders, endorsed "Tender for Tar," to be sent to the undersigned not later than noon, April 24, 1899.

No Tender necessarily accepted.

By order,
CHAS. COSTEKER,
Town Clerk.

Town Clerk's Office, Darwen.

BOROUGH OF MANSFIELD,
(GAS DEPARTMENT.)

THE Corporation are prepared to receive TENDERS for the supply and erection of Four 25 feet square by 5 ft. 6 in. PURIFIERS, complete with Staging, Lifting and Elevating Machinery, and 18-inch WECK'S PATENT CENTRE-VALVES complete.

The Plans may be seen, and Specifications and Forms of Tender obtained on deposit of £2 2s. from the undersigned.

The Deposit will be returned, after a contract has been entered into, to every person making a *bonâ-fide* Tender and on return of the documents entrusted to him. In the event of a Tender being withdrawn, the deposit will be forfeited.

Sealed Tenders, endorsed "Purifiers," on the Forms supplied, together with Specification, to be delivered at the Office of Mr. J. Harrop White, Deputy Town Clerk, Mansfield, before Twelve o'clock noon, Friday, the 28th of April, 1899.

The Corporation do not bind themselves to accept the lowest or any Tender.

The successful Contractor will be required to pay the Standard Rate of Wages.

ARTHUR GRAHAM,
Engineer and Manager.

Gas-Works, Mansfield,
April 7, 1899.

TENDERS FOR GAS COAL.

THE Brentwood Gas, Coke, and Light Company, Limited, invite TENDERS for the supply of about 4200 Tons of DURHAM GAS COAL, in Trucks at Brentwood Railway Station (G.E.R.), to be delivered in the following quantities the second week of each month: June, 140 tons; July, 163 tons; August, 300 tons; September, 500 tons; October, 500 tons; November, 500 tons; December, 510 tons; January, 500 tons; February, 350 tons; March, 300 tons; April, 250 tons; May, 190 tons.

TENDERS are also invited for 500 tons of SILKSTONE or other good INLAND COAL, in Trucks at Brentwood Railway Station (G.E.R.), to be delivered in the following quantities: September, 100 tons; October, 200 tons; November, 200 tons.

Tenders with Analysis of the Coal to be supplied, and Terms for monthly payments, to be sent to the undersigned, on or before the 29th inst.

Payments will only be made on the quantities delivered over the weighbridge belonging to the Great Eastern Railway Company at this Station.

Forms of Tender not supplied.

The Directors do not bind themselves to accept the lowest or any Tender.

C. A. FIELDER,
Secretary.

Brentwood, Essex,
April 8, 1899.

COUNTY BOROUGH OF WIGAN.

TENDERS FOR STORES.

THE Gas Committee invite Tenders as follows:—

Contract No. 1—Cast Mains and Connections.
" 2—Wrought-Iron Tubes and Fittings.
" 3—Brass Tubes and Fittings.
" 4—Lead Pipe.
" 5—Block Tin.
" 6—Firing and Charging Shovels.
" 7—Brooms.
" 8—Wood Troughing and Covering.
" 9—Galvanized Stove-Pipe & Connections.
" 10—Bar Iron.
" 11—Street-Lamps.
" 12—Galvanized Iron Buckets.

The Contracts will be for One Year, commencing on the 1st of April, 1899, and ending on the 31st of March, 1900.

Forms of Tender to be obtained from the undersigned.

The Committee do not bind themselves to accept the lowest or any Tender.

Tenders, sealed and endorsed with the name of the article tendered for (a sample of which must be forwarded addressed to the Gas Engineer), to be addressed and delivered to J. J. Charnock, Esq., Town Clerk, Town Hall, on or before Monday, the 17th of April next.

JOS. TIMMINS,
Engineer.

Borough Gas-Works,
Wigan, March 23, 1899.

BOROUGH OF COLNE.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the surplus TAR made at their Works during the Year ending March 31, 1900.

Estimated quantity, 750 Tons.

Tenders, endorsed "Tar," to be delivered to the undersigned on or before Wednesday, the 19th day of April, 1899.

FRED. THORPE,
Engineer and Manager.

Engineer's Office, Gas-Works,
Colne, Lancs., March 29, 1899.

ILKLEY URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE Gas Committee of the above Council invite TENDERS for the supply of 6500 Tons of Best Screened GAS COAL, to be delivered at Ilkley Station during the next Twelve Months, in such quantities monthly as may be required.

Sealed Tenders, addressed to the Chairman of the Gas Committee, endorsed "Tender for Coal," must be delivered not later than April 26, 1899.

The lowest or any Tender not necessarily accepted.

By order,
WM. EVERITT,
Manager.

Gas Offices, Leeds Road, Ilkley.

THE Directors of the Shrewsbury Gas-light Company invite TENDERS for the supply of the following CAST-IRON SOCKET and SPIGOT PIPES, coated—viz.,
1200 yards of 6-inch,
1300 yards of 5-inch.

The Tenders to state weights, and price per ton delivered to Shrewsbury, G.W. or L. & N.W. Railways.

Delivery must be made during June, 1899.

Tenders to be sent to the undersigned, on or before April 19, 1899.

By order,
WM. BELTON, Assoc.M.Inst.C.E.,
Secretary and Manager.

Gas-Works, Shrewsbury,
March 23, 1899.

BOROUGH OF CHORLEY.

TO RETORT MANUFACTURERS.

THE Corporation of Chorley are prepared to receive TENDERS for the supply of 32 D-shaped RETORTS, 21 in. by 15 in. by 10 ft. long, and 18 RETORTS, 22 in. by 16 in. by 10 ft. long.

Any further Information may be obtained on application to the Gas Manager at the Gas-Works, Chorley.

Tenders, endorsed "Retorts," to be sent to me on or before Tuesday, the 18th inst.

By order,
JOHN MILLS,
Town Clerk.

Town Hall, Chorley,
April 6, 1899.

BOROUGH OF LONGTON.

TENDERS FOR TAR.

THE Gas Committee are prepared to receive TENDERS for the purchase of the surplus TAR made at their Works during One Year, commencing the 1st of August next, and TENDERS are also invited for a term of Two Years, commencing the 1st of August next.

Tenders, endorsed "Tender for Tar," and addressed to the Chairman of the Gas Committee, Gas-Works, Longton, to be sent in not later than Wednesday, the 26th of April.

The highest or any Tender not necessarily accepted.

W. B. M'GREGOR, Assoc.M.Inst.C.E.,
Manager.

April 7, 1899.

ASHFORD URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of 5000 Tons of GAS COAL, between the 1st of July, 1899, and the 30th of June, 1900.

Delivery to be at the Gas-Works S.E. Railway Siding, Ashford, Kent, or on Ship at loading port nearest to Colliery.

Forms of Tender and Information may be obtained on application (in writing only) from J. Morton, Manager, Gas-Works.

Tenders (endorsed "Coal") to be delivered, on or before Five p.m. on Friday, April 28, 1899, at my Office, 11, Bank Street, Ashford, Kent.

JOHN CREEBY,
Clerk.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply and erection of the PURIFIERS, VALVES, CONNECTIONS, &c., required at their Liverpool Street Works.

The Drawings may be seen, and copies of the Specification and Form of Tender obtained (for which a charge of £1 1s. will be made, to be returned on receipt of a *bonâ-fide* Tender), by applying to the Gas Engineer, Gas Offices, Bloom Street, Salford.

Sealed Tenders, endorsed "Tender for Purifiers," addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be delivered to me not later than Three p.m. on Thursday, the 20th of April, 1899.

The lowest or any Tender will not necessarily be accepted.

By order,
SAML. BROWN,
Town Clerk.

Town Hall, Salford,
April 7, 1899.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

£18,870 OF FOUR PER CENT. PERPETUAL DEBENTURE STOCK,
OFFERING TO TRUSTEES AND OTHERS AN INVESTMENT OF THE HIGHEST CLASS.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, London, E.C., on Wednesday, April 12, at Two o'clock, in Lots.

Particulars at the HEAD OFFICES of the COMPANY, in D'Olier Street, DUBLIN; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
CROMER GAS AND COKE COMPANY.

£3000 OF ORDINARY STOCK.

Ranking for a Standard Dividend of 5 per cent. per annum; the last Dividend on similar Stock having been 4 per cent.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, April 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

GAS AND WATER STOCKS AND SHARES
IN THE
KING'S LYNN GAS COMPANY,
ROMFORD GAS AND COKE COMPANY,
SOUTH-WEST SUBURBAN WATER COMPANY,
WEST SURREY WATER COMPANY, AND
FELIXSTOWE GAS COMPANY.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, April 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.
£20,000
FOUR PER CENT. PERPETUAL DEBENTURE STOCK
OF THE
WEST HAM GAS COMPANY.

Offering to Trustees and others an Investment of the soundest character.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Monday, April 24, 1899, at Two o'clock, in Lots.

Particulars of the SECRETARY of the Company, at the Offices, Union Street, STRATFORD; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of The Aldershot Gas and Water Company, the Directors of the Crays Gas Company, the Directors of the Worthing Gaslight and Coke Company, the Trustees of the late Robert Higdon, Esq., and other Owners.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Wednesday, April 26, at Two o'clock, in Lots:—

ALDERSHOT GAS AND WATER COMPANY.—300 £10 FIVE PER CENT. PREFERENCE SHARES.

CRAYS GAS COMPANY.—£2000 of FIVE PER CENT. STOCK.

WORTHING GASLIGHT AND COKE COMPANY.—300 £10 SHARES.

Also STOCKS and SHARES in the BRIGHTON AND HOVE GENERAL GAS COMPANY, and the

WEST HAM GAS COMPANY.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the Lowestoft Water and Gas Company, the Directors of the Southend Water-Works Company, and the Directors of the Enfield Gas Company.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Monday, May 8, at Two o'clock, in Lots:—

LOWESTOFT WATER AND GAS COMPANY—£6250 FOUR PER CENT. PERPETUAL DEBENTURE STOCK, and 132 £10 SHARES.

SOUTHEND WATER-WORKS COMPANY—500 £10 SHARES; and

ENFIELD GAS COMPANY—£8500 STOCK.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

THE MARKET HARBOROUGH URBAN DISTRICT COUNCIL
(GAS DEPARTMENT)

INVITE Tenders for the following Cast-IRON SOCKET and SPIGOT PIPES, coated:—

530	yards	12-inch in 12-feet	Lengths.
90	"	10-inch " 9-feet	"
30	"	8 inch " 9-feet	"
300	"	6-inch " 9-feet	"
550	"	4-inch " 9-feet	"

Tenders to state Weights and Price per Ton, delivered free to either Midland or L. & N.W. Railway Siding here; also Price per Ton for SPECIALS. Early delivery of 12-inch Pipes and Specials essential.

Further Particulars from, and sealed Tenders to, the undersigned on or before April 15, Ten a.m.

J. FRYER,
Manager.

Gas Offices, Market Harborough,
April 1, 1899.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
(INCORPORATED BY ACT OF PARLIAMENT.)

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of Proprietors of this Association will be held at the City Terminus Hotel, Cannon Street, London, E.C., on Tuesday, the 2nd of May next, at 2.30 p.m. precisely, when a Report will be made to the Proprietors, a Dividend declared for the Half Year ended the 31st of December, 1898, and the usual Ordinary Business of such Meeting transacted.

In pursuance of the Resolution passed by the Proprietors at the last Half-Yearly Ordinary General Meeting, Sir Joseph Sebag Montefiore, on behalf of the Committee of Proprietors, will move the grant of an HONORARIUM TO THE DIRECTORS.

Notice is Hereby also Given, that the CAPITAL STOCK TRANSFER BOOKS WILL BE CLOSED from the 18th inst. to the 2nd prox., both days inclusive.

The Dividend will be paid on the 9th of May.

By order of the Board,
ROBERT W. WILSON,
Secretary.

21, Austin Friars, London, E.C.,
April 10, 1899.

THE Acetylene Illuminating Company, Limited, 63, Queen Victoria Street, London, E.C., GIVE NOTICE that they hold the BRITISH PATENT RIGHTS for the MANUFACTURE OF CALCIUM CARBIDE by means of the electric furnace, that they are bringing an action against the Midland Acetylene (Parent) Syndicate, Limited, to restrain them from so manufacturing that product, and that they intend in the future to bring actions against all infringers of these Patents and all purchasers or users of Carbide of Calcium made in infringement of the same.

NOTICE.

THE Acetylene Illuminating Company, Limited, having published and issued an advertisement or circular claiming that they hold the British Patents for the Manufacture of Calcium Carbide by means of the Electric Furnace, we guarantee to indemnify anyone who buys Carbide from us against any claim by "The Acetylene Illuminating Company, Limited," or anyone else.

THE READ-HOLLIDAY ACETYLENE COMPANY, LIMITED, Acetylene Gas Engineers and Carbide of Calcium Manufacturers, HUDDERSFIELD.

NOTICE.

THE Acetylene Illuminating Company, Limited, having published and issued an advertisement or circular claiming that they hold the British Patents for the Manufacture of Calcium Carbide by means of the Electric Furnace, we guarantee to indemnify anyone who buys Carbide from us against any claim by "The Acetylene Illuminating Company, Limited," or anyone else.

TINKER AND HOLLIDAY, LIMITED, Carbide of Calcium Manufacturers, HAZELHEAD, SHEFFIELD.

TUBES AND FITTINGS
ALL KINDS
WRITE FOR PRICES
STAFFORDSHIRE TUBE Co., BIRMINGHAM.

Foolscap 4to, pp. 535, with 239 Illustrations and Steel Plate Engraving (as Frontispiece) of WILLIAM MURDOCH, *Inventor of Gas Lighting. Morocco Gilt, 21s.; Roan Gilt, 18s.*

THE SIXTH (AND CENTENARY) EDITION
OF THE
HANDBOOK
FOR
GAS ENGINEERS AND MANAGERS.
BY
THOMAS NEWBIGGING,
M.Inst.C.E.

LONDON:
WALTER KING, 11, BOLT COURT,
FLEET STREET, E.C.

Price 6s., Cloth Bound,

THE CHEMISTRY OF ILLUMINATING GAS.

By N. H. HUMPHRYS, Assoc.M.Inst.C.E., F.C.S.

This work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas; Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation; Condensation; and Purification.

LONDON: Walter King, 11, Bolt Court, Fleet St., E.C.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.

Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.

Telegrams: "DARWINIAN, MANCHESTER." Telephone 1806.

ENRICH YOUR GAS
WITH
CHEAP BENZOL.

AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to SADLER & CO., MIDDLESBROUGH.

HEBBURN MAIN GAS COALS.

Yield of Gas per Ton . .	10,500 Cubic Feet.
Illuminating Power . . .	16·4 Candles.
Coke	68 per Cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to
The Wallsend & Hebburn Coal Company, Ltd.
B Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH N.B.

"A most useful Book of Reference, which no Water-Works Engineer should be without."

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Containing References, Tables, Notes, Memoranda, and Detailed Advertisements in Relation to Water-Works Engineering; also Illustrated Description and Prices of Apparatus, Appliances, Tools, and Material required on a Water-Works.

By J. T. RODDA,

Assoc.M.Inst.C.E., Assoc.M.Inst.Mech.E., Member of the British Association of Water-Works Engineers.

PRICE 5s.

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per Ton. .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to

W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON, NEWCASTLE."

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:
90, CANNON STREET, E.C.

EVESON FOR CANNEL

TELEGRAMS: "EVESON, BIRMINGHAM."

BENZOL.

SPECIALLY prepared for Enriching Gas and PREVENTING THE STOPPAGE OF SERVICE-PIPES by the deposit of Naphthalene. Price 10d. per Gallon, free on rails at our Works in Drums (returnable).

Apply WHITWOOD CHEMICAL CO., Ltd., WHITWOOD COLLIERIES, Nr. NORMANTON.

JAMES OAKES & CO.

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM

INCANDESCENT GAS LIGHTING.

Incandescent Burners from 5/6 per doz.

Specially annealed best Fireproof Glass Chimneys (equal to the Jena). 1/4 per Doz.

All other Incandescent Fittings at greatly reduced Prices.

Patentees of the "IMPROVED STANDARD GLOBE-CHIMNEY."

Best "Comet" Bulbs, 2/6 per Dozen.

Write for Illustrated Price Lists.

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THE PATENT

"BEACON" GLOBE LAMP.

As fitted up at London Bridge Railways' Approach, and Kennington Park, S.E.

H. GREENE & SONS, Ld.,
Late of Cannon Street,
19, FARRINGDON RD., E.C.
Telegrams: "LUMINOSITY, LONDON."

G. & J. HAIGH,

Raven's Lodge Fire-Brick Works, DEWSBURY.

Manufacturers of MACHINE-MADE RETORTS and FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character, suitable for **GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.**

For Prices and Analysis, apply as above.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

Midland District Office: PRINCE'S CHAMBERS, 6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.
Telegraphic Address: "WIGAN, BIRMINGHAM." Telephone No. 200.

London District Office: 6, STRAND, LONDON—C. PARKER & SON, Sole Agents.
Telegraphic Address: "PARKER, LONDON."

CAUTION! CAUTION! CAUTION!

Incandescent Gas Lighting.

All Dealers and the Public are cautioned against Buying, Selling, or Using the **MANTLES** advertised by the **CONTINENTAL INCANDESCENT GAS-LIGHT COMPANY**, of Rotterdam, which are **AN INFRINGEMENT OF THE "WELSBACH" PATENTS.**

Many Injunctions have been obtained against Sellers of these goods; and the parties connected with this so-called Company have already **BEEN COMMITTED TO PRISON FOR CONTEMPT OF COURT**, and have **FLED TO ROTTERDAM** to avoid subsequent further Imprisonment.

Large Shipments of these Mantles have been seized by Order of the High Court; and the Receiver **HAS AUTHORITY TO OBTAIN POSSESSION OF ALL SUCH MANTLES.**

Servants or Agents or anyone assisting to evade the Injunction already obtained, including (after this notice) Advertising Agents and Newspapers are equally liable to be committed to Prison.

A REWARD will be given to anyone giving such Information as will lead to any Shipments of these Mantles being taken possession of.

THE "WELSBACH" INCANDESCENT GAS-LIGHT COMPANY, LTD.

YORK STREET & PALMER STREET, WESTMINSTER, LONDON, S.W.

INCLINED RETORTS

UP-TO-DATE FURNACES AND SETTINGS.

J. & H. ROBUS, 20, Bucklersbury, London, E.C.

Important Improvements in Spent Lime Recovery

(G. R. HISLOP'S PATENTS).

By Recent Improvements, based upon long experience in all possible methods of Recovering Spent Lime, the Patentee begs to bring under the notice of Gas Engineers, Companies, and Corporations, the **Great Economy** and **Permanent Advantages** which the adoption of the System would secure. The Cost of Recovery is **guaranteed** to be largely under that of New Lime, and also that it will do as much work in the Purifiers, and with a considerably Diminished Working Pressure. Spent Lime, chiefly or wholly in the condition of Carbonate, such as resulting from the Purification of Water Gas, or by Passing Foul Gas through Oxide of Iron before the Lime, is **recovered** for **many years continuously** with absolutely unimpaired efficiency as a Purifying Agent.

Enquiries respectfully solicited. Full Particulars as to Cost of Plant, Cost of Production of Quick-Lime per Ton, together with Samples of the Restored Material (if desired), on application to

R. F. HISLOP, F.C.S., Gas Engineer, Craigielea, PAISLEY, Agent for Patentee.

D. HULETT & CO., LTD.,

55 & 56, HIGH HOLBORN, LONDON.

"HANDY" SERVICE CLEANSERS.

Light and Powerful. Price **50s.** each.

DRY GAS-METER MAKERS.

WROUGHT-IRON TUBES AND FITTINGS.

STREET LAMPS & COLUMNS.

Price Lists on Application.

MOBBERLEY & PERRY

STOURBRIDGE.

Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c, &c.

EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.

London Agents: Contractors for the erection of Retort-Benches complete.

BALE & HARDY, Gas Engineers and Contractors, BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

W. J. JENKINS & CO., LTD.

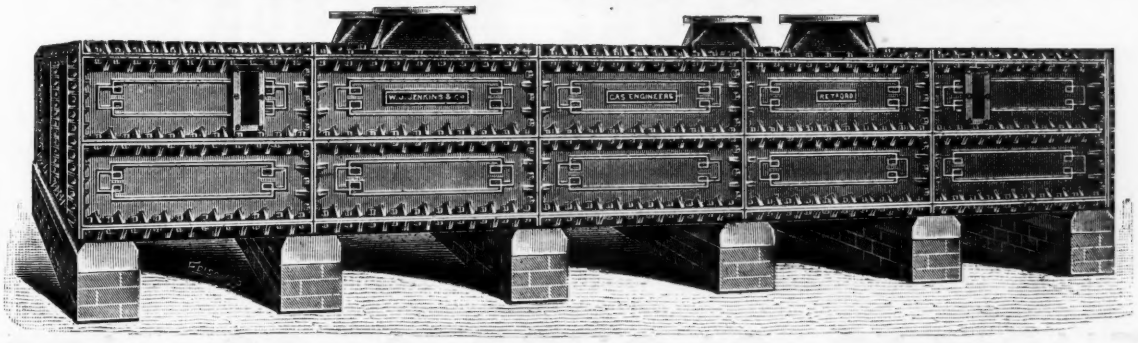
GAS ENGINEERS AND IRONFOUNDERS,

MAKERS OF ALL KINDS OF

PLANT AND MACHINERY FOR GAS-WORKS.

COAL BREAKING, ELEVATING, & CONVEYING MACHINERY.

LIVESEY WASHERS.



5,000,000 Cub. Ft. WASHER AS SUPPLIED TO THE SHEFFIELD UNITED GAS COMPANY.

HIGHLY ECONOMICAL AIR-COMPRESSORS.

GAS COMPRESSORS AND EXHAUSTERS.

TUBULAR CONDENSERS, COOLERS, LIQUOR TANKS, VALVES, &c.

RETFORD.

AMERICAN GAS OIL

SOLE IMPORTERS—

ANGLO-AMERICAN OIL COMPANY, LIMITED,

This well-known quality of Oil is used at most of the Corporation Works and Companies' Works throughout the United Kingdom. Contracts have also been entered into with several of the large Railway Companies.

LARGE STOCKS. PROMPT DELIVERY.

Stock of about 30,000 Tons is usually carried by us at our Installations at Avonmouth, Birkenhead, Barrow, Manchester, and London.

HEAD OFFICE:

22, BILLITER STREET, LONDON, E.C.

ESTABLISHED 1844. **ORIGINAL MAKERS.** ESTABLISHED 1844.

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

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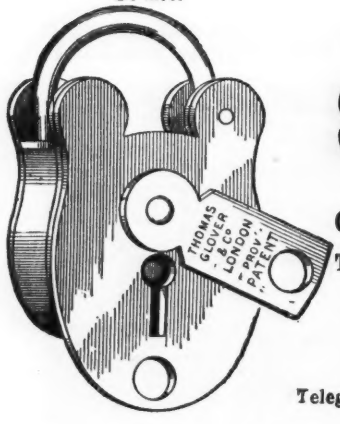

THOMAS GLOVER & CO.'S

PATENT

SECURE PADLOCK

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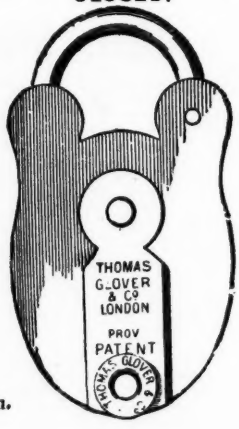

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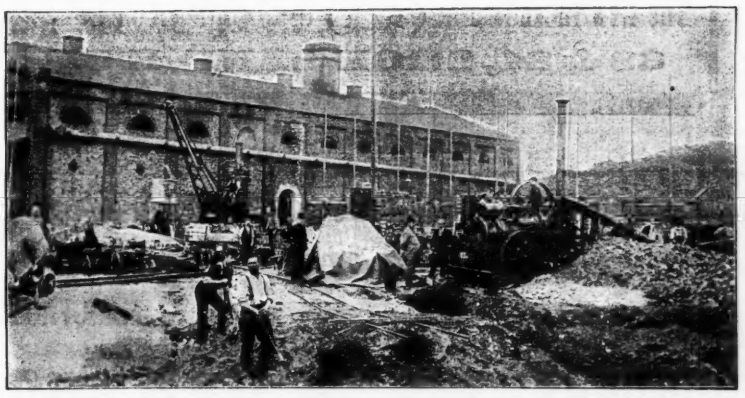

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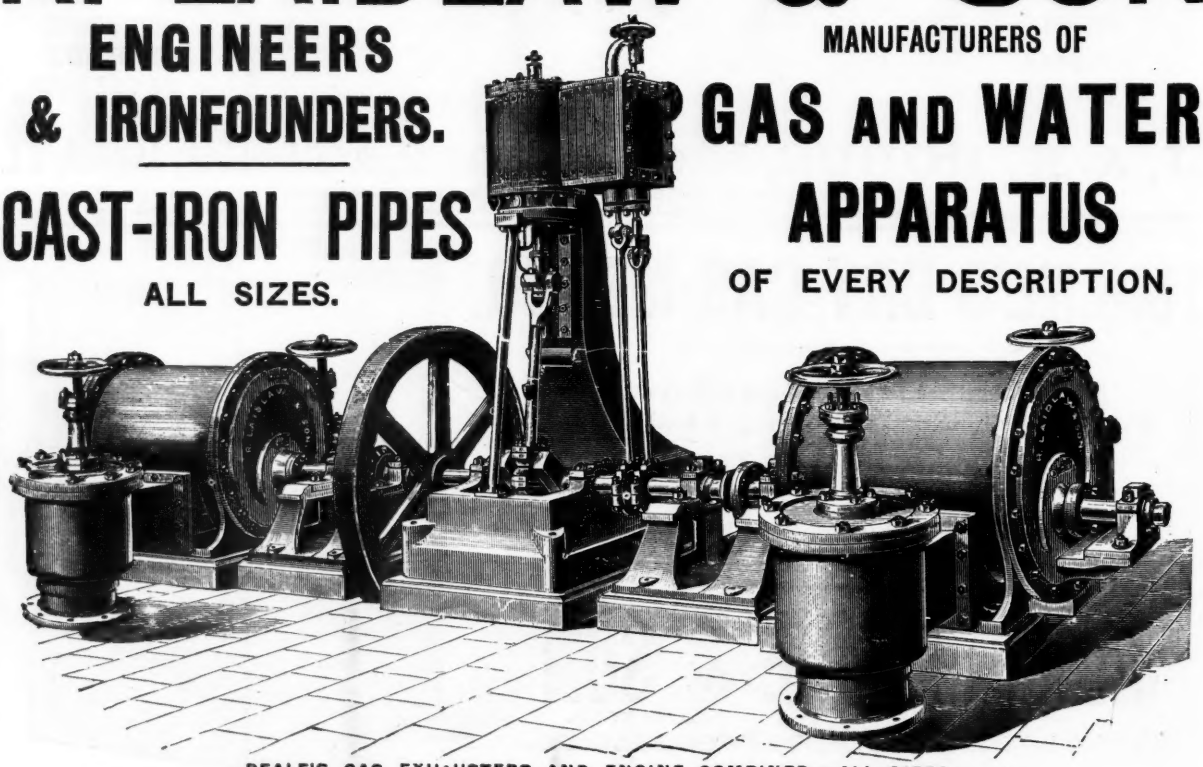

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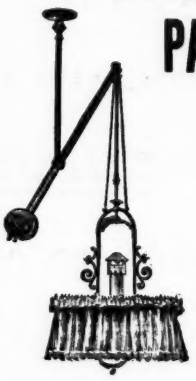

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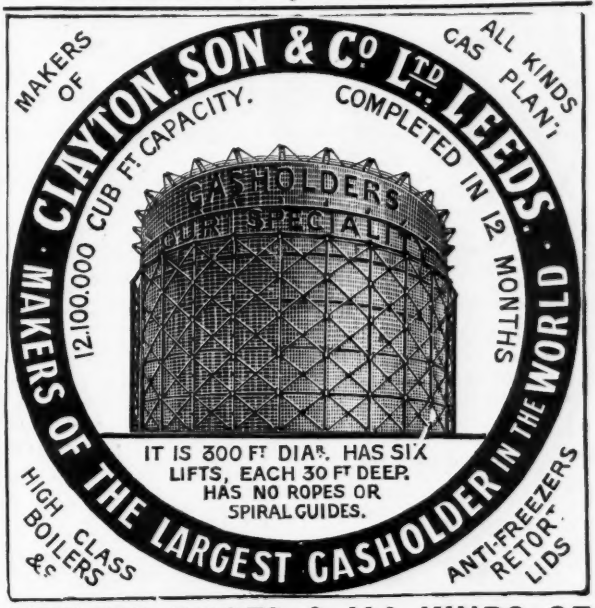
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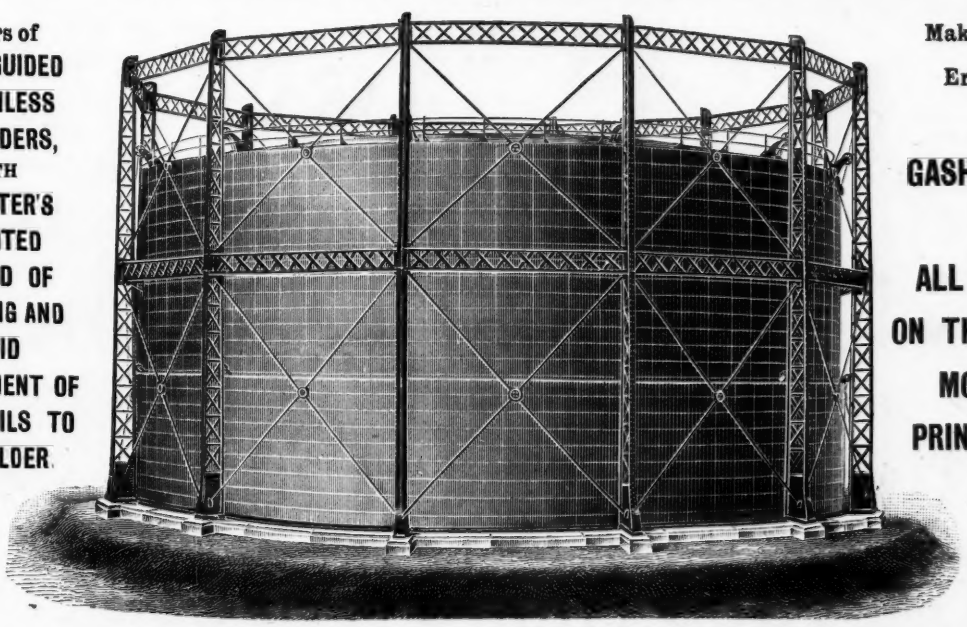

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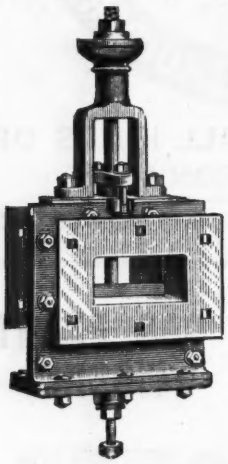

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